IN THIS ISSUE: The Growing Ind... ...oad of the West

JOURNAL OF ELECTRICITY

VOL. 44 NO. 7 SAN FRANCISCO, APRIL 1, 1920 PER COPY, 25 CENTS

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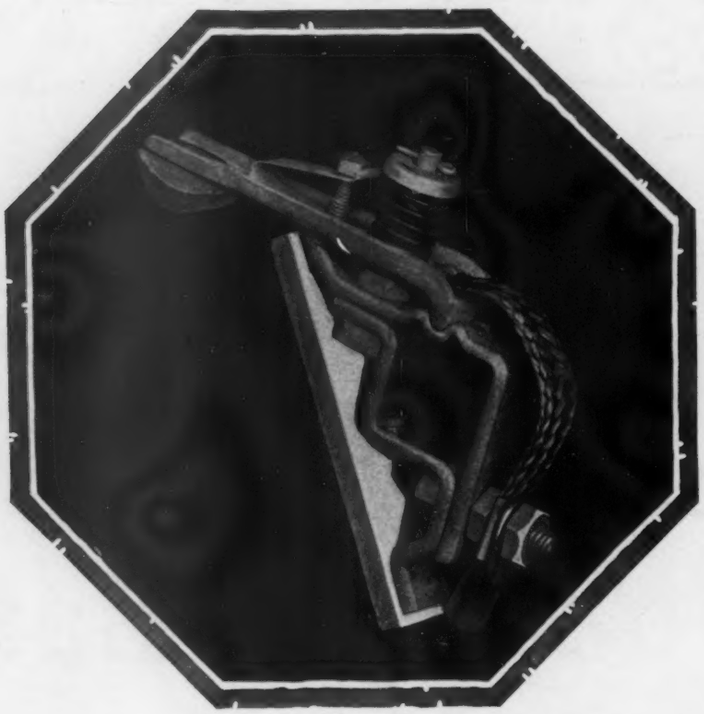

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JOURNAL OF ELECTRICITY

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ROBERT SIBLEY, Editor

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The world's first and only electrified trans-continental railroad

crossing the Cascades and Rocky Mountains. The bridging of the continental divide by an electrified railroad is here matched as a new record in accomplishment by the crossing of the Cascade Mountains in the great Northwest on March 6, 1920. The view shows the Chicago, Milwaukee and Puget Sound Railroad electrically operated in the snow-clad mountains of the Northwest as the train appeared on its recent trial trip.

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JOURNAL OF ELECTRICITY

DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 44 SAN FRANCISCO, APRIL 1, 1920 Number 7

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The Engineer and Electrical Development Building

¶ "Man hath need of home" is a saying as true today as it was thousands of years ago before the dawn of modern civilization.

¶ In the West where engineering attainment on such a vast and unprecedented scale has ever been the watchword of accomplishment, the need for an engineering headquarters is unusually emphatic. There has been much informal discussion during recent months concerning the building of a twelve to fifteen story edifice in the City of San Francisco to serve as a headquarters for engineering organizations of the West, and also for engineering business institutions and commercial houses closely affiliated with engineering activities. Practically every large concern thus far approached upon the matter has signified an unusual interest, and during recent months public-spirited engineers interested in the enterprise have practically been assured adequate financial support from certain eastern centers to erect a structure of sufficient size to dominate the sky line of San Francisco, should requisite preliminary rentals and long-time leases be secured to make the venture a reasonably profitable one.

¶ With three upper stories devoted to day and night quarters for engineers, both resident in the district and coming in from outside districts of the West; equipped with committee rooms, auditorium, swimming pool, and all features that would lend to business and livableness, such an institution would certainly continue to develop a vigor and health in the engineering profession that has so characterized this young and growing professional life during the past decade in the West.

¶ On another page of this issue of the Journal of Electricity is set forth a preliminary survey of costs and proposed rentals, and it is to be hoped that all who are directly interested will make preliminary application at their very earliest convenience in order that the matter may be disposed of with the vigor and despatch that characterize a venture of this nature.

¶ The project is a big one, the vision is vast, but is again only emblematic of what the engineer of the West dreams and puts into constructive achievement.

The Insistent Demand for More Power

On all sides comes the demand for more power in the West. One of the most fertile valleys of California, for instance, that of the San Joaquin river, is at the present time only about twenty per cent developed, and the other eighty per cent is absolutely dependent on hydro-electric power and nothing else. If the companies do not get the necessary money for development the vast San Joaquin Valley will remain untouched.

As brought out in a recent hearing before the California Railroad Commission, there is certainly one thing which must be realized, and that is that there is nothing sacred about money. It is a commodity that will flow where the highest prices obtain. At this particular hearing, evidence was brought to show that the dictum of the California Railroad Commission, given at the beginning of the war to the effect that the corporations of California shall be kept solvent, has done more to attract the attention of investors to California securities than any other one act of record.

That the people should know the full responsibilities that are today placed upon the electrical industry and the necessity for vast sums of money in this development is the one crying need of the hour. The money, for instance, required in California alone during the next ten-year period is estimated at between $250,000,000 and $500,000,000. No authority has placed the amount below the $250,000,000 mark. How, then, are these vast sums of money to be acquired? Only by the clearest thinking will it be possible, and the people themselves must continually, by every known means of educational effort, be brought to see the clear facts at issue. Thus and thus alone, will the insistent demand for power development be met and our great West go forward unhampered.

Land Appraisal by Jury

It often occurs that land which must be used for reservoir sites or for right of way purposes must be obtained by a process of condemnation. Under existing laws, this means a trial by jury, before whom testimony is presented by both sides as to the value of the property in question. It is natural that the testimony as presented by the owner of the land should allow as high a figure as will seem at all probable, whereas the company desiring to make the purchase will trim down the payment to market value plus some small allowance for forced sale. The usual result is that the jury splits the difference, a proceeding which is far from scientific and usually unjust. It is obvious that the company experts have a lower limit beyond which their estimates may not go. However prejudiced you suppose their testimony to be, the figure cannot be less than zero. On the other hand, the owner may claim the sky as his limit—and sometimes approaches very near it. Supposing both sides to have done their worst, the result of averaging the two is bound to be in favor of the owner.

As a matter of fact, the jury system of fixing values has little to recommend it. In the endeavor of our laws to secure unprejudiced judgments, we often go to the extreme of assuming that in order to judge fairly, a man must know nothing about the matter in hand. Of course, the owner must be protected from unjust seizure of his land, but it seems that the function of the jury might consist in determining that the land should be sold. Neutral experts to appraise the value of the land could then be appointed by the court—an arrangement which does away with the absurdity of an "expert" who is called in to prove one side of a case rather than to arrive at a dispassionate estimate. Market value is a figure not difficult to obtain—and the addition of a fixed percentage allowed for the forced sale brings the price to a fair result which should then be accepted without revision.

What is Matter?

Said the Englishman, "Where is my 'at?" and the American replied, "Where am I at?" And so, when we stop to consider the wonderful new advance in modern science presented in Einstein's theory of matter, or rather relativity, brought out by the recent articles by Dr. A. C. Crehore on the New Physics, which have been appearing in the columns of the Journal of Electricity, we are brought face to face with the question, "What indeed is matter?"

Dr. Crehore has shown in this series of articles in an unusually simple and helpful manner that matter, so far as we know it, may have no existence at all save that of energy. It is quite evident, then, so far as our physical senses are concerned, that they lie to us and we are unable to prove from their testimony the ultimate composition of matter. A consideration of this subject brings up the fact that, in many instances, the conjectures and conclusions of these five senses are indeed unreliable. Our eyes would tell us that the man driving the peg on the distant mountain side creates a noise by slugging the air in his upward stroke, were it not for the fact that we are familiar from other sources with the phenomena of echo and sound travel. Our sense of feeling has been known to be so strong in the case of imagination, that in cases where students have playfully bound men hand and foot and passed ice over their bodies, telling them that they were freezing to death, death has actually resulted. And so on down, in each case, we may find that these five physical senses lie to us on various occasions.

Hence, may it not be true that all objective phenomena that we observe are at present wholly unknown to us save only by conjecture? There is one thing, however, that we do know independent of the testimony of these five physical senses, and that is that we are conscious, that we have conscious existence, and from this mode of reasoning we see all phenomena presented to consciousness as a direct effect of mind. This would indicate that our physicists are arriving at the inevitable conclusion that all is mind and its infinite manifestation. Thus by examining closely the deductions of Dr. Crehore, in which he proves that matter is nothing but energy beyond a question of a doubt so far as all mathematical reasoning enables us to deduce, we come to the conclusion that energy must be the effect of mind.

Rating Motors in Watts

The rapid increase in power applications in rural communities, particularly in the West where the number of motors installed for pumping irrigation water is mounting by leaps and bounds, brings out forcefully the necessity for a revision of nameplate ratings to meet the consumer's viewpoint.

The manufacturer who is first to add to the nameplates of his motors their ratings in watts, or kilowatts, will achieve a decided advantage over his competitors. Salesmen, and other employes of power companies, who meet the consumers, talk kilowatts of generating and line capacity, kilowatts of transformers, bill him for kilowatt-hours and then leave it to his mental agility to convert these to horsepower. It is no small thing; the consumers must be served, and service means, in this case, reasonable consistency of ratings. In practice the change to watt rating can be made with the greatest facility: the horsepower need not be omitted at present, but should be subordinated to the more logical rating which will in time become standard.

Labor and Labor Statistics

A few years ago the Northwest Electric Light and Power Association had a committee on Labor Statistics, which, during its existence, collected a considerable amout of very valuable data regarding labor conditions and wages current at the time, for the various classes of labor employed by members of the association.

The present conditions of high prices and scarcity of labor lead to the conclusion that the appointment at this time of similar committees by the Northwest Electric Light and Power Association

would be of the greatest benefit to all concerned. In the formation of such committees the scope of their work should be given very careful consideration, as the subject is one that could be handled with good results and one that might, on the other hand, be carried to extremes that would not be in keeping with the best interests of all concerned. The committees should be limited in their activities to the collection and compilation of data regarding the working conditions such as hours of labor, relations with outside organizations, welfare work, and to matters of compensation.

The matter of compensation should, however, not be restricted to what is commonly called Labor, including only such as linemen, operators, mechanics, clerks, etc., but should be widened to include such employes as engineers and department heads. With such an aim in view, and with active committees, alive to the opportunity of promoting the best interests of both employers and employes, the proposition is one which should be backed by every interest.

Contractor-Dealer Activities in the Northwest

That the cooperative idea is taking hold in the Northwest is seen in the significant fact that at a late meeting of the Advisory Committee of the Northwest Electric Light and Power Association at Seattle, all of the delegates evidenced a desire for closer cooperation. The cooperative idea, started in California, has reached its greatest development in that state, the results of which will be shown at the various conventions at Pasadena in the middle of May—namely, the Pacific Coast Section, N. E. L. A., May 17, the California Association of Contractor-Dealers on May 18, and the N. E. L. A. Convention May 19-22. To the contractor-dealer the afternoon session of the Pacific Coast Section, N. E. L. A., on May 17, will be of particular interest, for the discussion of Mr. Garnett Young's paper on a campaign for more outlets will take place, and Mr. A. W. Childs will present a paper on appliance solicitors. The California Association of Contractor-Dealers' meeting on May 18 should be attended by all of the contractor-dealers of the Pacific Northwest, since it will give them a golden opportunity to see the working out of the contractor-dealer's side of the cooperative plan and the benefit it has been to him. The men of the Northwest will be able to take advantage of the experiences of the California contractor-dealers in this campaign and take back a working plan that has proven a success.

Mr. L. H Newbert, who is chairman of the Advisory Committee of the California Electrical Cooperative Campaign will make his report and show in cold, hard, indisputable figures the benefit in dollars and cents, the increase of business and betterment of service to each other, brought about in 1919 by the campaign. Since it has proven a success financially and otherwise in California, the contractor-dealers, not only of the Northwest, but of all the West should be present at Pasadena in May to benefit by the information that will be there, to meet the big men in the electrical business from all over the United States, and to present the importance of the contractor-dealer movement in the field of electrical industry.

Aeroplane to Aid in Hydroelectric Development

What is probably the first attempt to utilize the aeroplane in hydroelectric construction work is the purchase of a one-ton bombing plane by the Southern California Edison Company to be used in transporting supplies of all kinds over an impassable mountain. The fourteen mile tunnel on the Florence Lake development is to be driven from both ends, since the north portal is located in an inaccessible spot, and the company is confronted with the building of a road to get in materials and supplies. To get away from this expense, which would be some $2,000,000, it has been decided to purchase a bombing plane, as machines of this type are sturdy and have proved their usefulness in the aerial mail service and in the passenger service between various towns. The vision of the men responsible for this gigantic step forward in construction methods is far ahead of the present, for the success of this experiment will mean the opening up of new projects that have heretofore been considered impracticable on account of their inaccessibility. It will mean that the vast resources of our mountains whose deep canyons and rugged peaks hide many excellent dam and reservoir sites, will be further revealed and exploited by scouting planes of the power companies which will be used in patrolling the high tension lines during most of the months of the year. That such a plan is feasible was shown the other day when an air enthusiast in taking a ride down the San Joaquin Valley noticed a break in a transmission line and on reaching the first town, landed and informed the company's local agent of the exact location of the break.

When the plane on the Florence Lake development jumps off on its first flight to the north it will be an epochal event, and the electrical industry as a whole will be waiting for the news of its success and at the start will truly wish it "Bon Voyage."

The Price of Oil

During the past fortnightly period the Standard Oil Company of California has announced a raise in the price of oil amounting to twenty-five cents a barrel. Viewed from many angles, the necessity for this increase, if such necessity really exists, is unfortunate. The West is at the present time passing through an unusual, critical and trying period, particularly in the supply of electrical energy for industry and agriculture. Not only is this condition acute on account of power shortage due to stopping of new construction work and development of the industry during the war period, but also the shortage in rain and snow in the mountains at the present time predicts an unusual status of affairs in the electrical industry during the next summer. The consequence is that increased oil will be necessary in this industry, for the steam electric plants must be depended upon to

the limit to furnish power. Roughly speaking, it is estimated that the gas and electric industries during the coming year will require some 11,000,000 barrels of oil in order to meet the unusual demand that has just been mentioned. It is readily seen that an additional $3,000,000 must be absorbed by the people of California in the way of increased revenues in order to meet this raise in oil price, when only this one branch of industry is considered.

This question of raise of prices without control or review from some source or other, aside from the company itself, brings each day to light the necessity for such a control or review, particularly in those instances and in those commercial enterprises, whether large or small, that are dominated to a particular extent by one or two large controlling factors.

Weather Forecasting

The recent period of extreme drought in the far West, particularly in California, which has worked a severe hardship on the agricultural industries of the state as well as curtailing the hydro-electric outputs of the various companies depending on stream flow and artificially created reservoirs, points out the need of intelligent forecasting of the weather farther in advance than has hitherto been attempted in any scientific manner. Weather records as obtained by the U. S. Weather Department over a period of sixty years, and others as calculated from the width of rings in trees many hundreds of years old, show clearly that the period of scant rainfall and the periods of rainfall above normal follow with regular recurrence. These records show that years of drought occur at intervals of from eight to twenty years and that the curve of maximum precipitation also follows a definite curve.

It is therefore only logical to assume that there is some underlying cause for this variation in rainfall, which is caused, on the Pacific Coast, by the centers of low pressure traveling from west to east—in the dry years passing across the country farther to the north. In the periods of super-normal rainfall, the areas of low pressure cross the country much farther to the south.

The Scripps Institution at La Jolla, California, has for a number of years been working on the hypothesis that changes in weather conditions are due to the upwelling of cold water from the depths of the Pacific ocean and have been taking regular records of ocean temperatures and salinity in an area adjacent to the southern portion of California. From the meager records already obtained this institution has forecasted the weather to some extent, and thus far have had their forecast upheld by the precipitation realized.

With the success of this experiment in mind, an extension of the investigations should be undertaken to cover a greater portion of the Pacific Ocean. More extensive investigations should necessarily come under the jurisdiction of some bureau of the United States Government which is well equipped with funds and trained personnel to accomplish the results so much needed.

Should the industries of the far West have available weather forecasts covering a period of some twelve months or so in the future, they would be in a position to equip themselves for the coming emergencies and many millions of dollars would be made and saved for the growing industries of the West.

Industrial Load Growing in the West

The Western region is generally looked upon as a non-industrial district, with its attention concentrated upon the development of its natural resources. It is interesting to note, therefore, that this condition is fast being outgrown. According to the latest census figures available, the West contains one-seventh of the population of the United States and at the same time produces one-seventh of the country's manufactures. This does not include such industries as the great fields of mining, lumber and agriculture, nor the recent developments in railway electrification, but represents factories, packing houses and similar enterprises. An idea of what this growth means is seen by the fact that ten years ago there were not more than 200 persons employed in the manufacture of electrical products in one Western state for which figures are available. Today, this number runs into the thousands and more than 200 employes are reckoned in one factory alone.

These enterprises have all grown up to meet legitimate needs of the region. The wealth of raw materials makes it feasible to manufacture close to the source of supply and in consequence a deversified load has grown up in the cities. The mineral riches of the district, combined with the high freight rates, have led to increasing loads in the electric smelting and electro-chemical field where it has been possible for the power companies to make favorable rates. In the purely rural districts certain prosperous industrial centers have grown up where related industries such as fruit packing, refrigeration to provide ice for transportation of fruit, and factories which handle agricultural by-products are dependent upon electricity for power. Elsewhere on these pages appear several articles covering a few of these developments, characterizing a new era of prosperity for the West.

Special Features of the April 15th Issue

Advance Publication of

PACIFIC COAST SECTION N. E. L. A. CONVENTION PAPERS

covering various phases of important western problems to be brought up at Pasadena, May 17-18

The interests of every branch of the electrical industry are represented in these important papers

Railroad Electrification in the West

(Fuel shortage, the cost of living and most other questions of the kind are intimately bound up with the problem of transportation. How electricity is contributing to the solution of this problem is embodied in the following account of the latest advance in railroad electrification in the West, and of the efficiency and economy of this form of motive power for transcontinental service.—The Editor.)

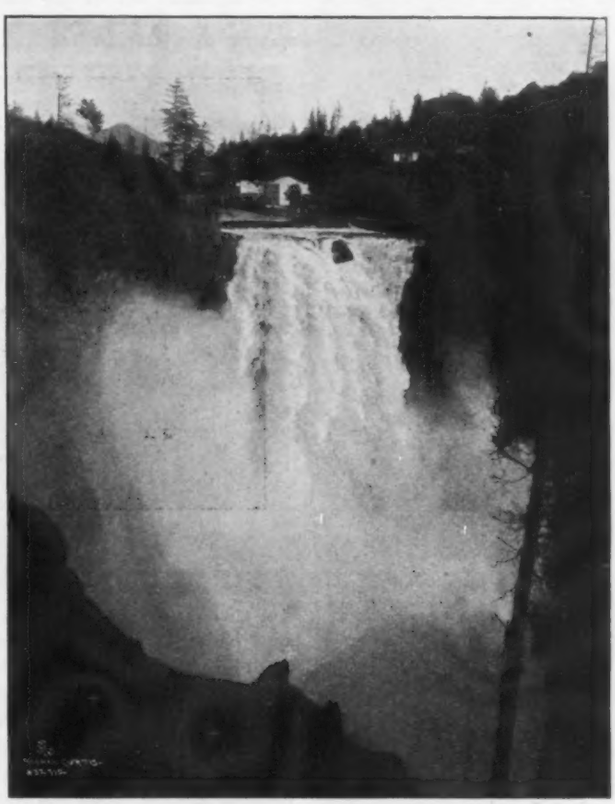
On March 5th the first train was run over the newly electrified coast division of the Chicago, Milwaukee & St. Paul Railroad, marking still another advance in Western railroad electrification.

The new division extends from Othello in central Washington to the shops in Tacoma, and adds 207.4 miles to the 440 miles previously electrified in Montana. Between Othello on the coast division and Avery, Idaho, on the Montana line, is a stretch of 212 miles which, when electrified, will complete a continuous system of 860 miles operated entirely by electricity, and employing about ninety electric locomotives in place of some 250 steam locomotives.

Type of Locomotive

The new Chicago, Milwaukee & St. Paul locomotives weigh 265 tons, and are designed for handling in normal service a 12-car train weighing 960 tons, trailing against a grade of 2 per cent at 25 miles per hour. For continuous operation they are designed to operate at 42,000 pounds tractive effort at a speed of 27 miles per hour. A special feature of their construction is a new scheme of connections by means of which four of the main locomotive motors are utilized to furnish exciting current during regeneration, thus reducing the size of the motor-generator set used for control, accessories and train lighting. An appreciable reduction in the weight of control equipment is obtained, at the same time providing for effective regenerative electric braking on the down grades. The engineer controls the speed by merely changing electrical connections.

The new locomotives will operate over the section between Othello, Seattle and Tacoma, including 17 miles of 2.2 per cent grade from the Columbia river west. The traffic over this division consists of heavy main line transcontinental passenger trains carrying from 8 to 12 steel passenger coaches, which will be handled over the maximum grades without helpers.



Snoqualmie falls, showing power plant of the Puget Sound Traction Light & Power Company in the distance. The generating station is 268 feet underground in a large cavern cut in solid basalt. The penstock goes down a vertical shaft and the tailrace enters the canyon of the river just below the falls. This is one of the two plants supplying power to the newly electrified western section of the Chicago, Milwaukee & St. Paul Railroad.

Sources of Power

All the electric current used in the operation of these trains is generated from water power, supplied by the hydroelectric plants of the Puget Sound Traction Light & Power Company on the west and from the Long Lake plant of the Washington Water Power Company on the Spokane river. On the west side of the Cascade Mountains the former company has three large generating stations, utilizing the waters of both the White river and the Puyallup river. The third plant is on the Snoqualmie. All three are interconnected and have a combined generating capacity of 114,533 horsepower, in addition to the 45,000 horsepower available from an auxiliary steam plant. This system of tied-in plants is in turn interconnected with a similar system of like capacity on the east side of the Cascade Mountains, uniting into one system some 1,500 miles of transmission lines.

The power furnished to the newest electrified section is taken from the Snoqualmie plant and the Long Lake plant, current being delivered to the railroad's transmission lines along its right of way at 100,000 volts, and stepped down at eight substations between Othello and Tacoma to 3,000 volts direct current, carried over the rails by overhead trolley wires.

Economies of Operation

Electrification on this and other roads has set a new standard for reliability and economy of operation. It is estimated that electric motive power for railways can be maintained for approximately one-third the cost of that of steam engines for the total train tonnage hauled. For the same freight tonnage handled on the Rocky Mountain division of the Chicago, Milwaukee & St. Paul, electric operation has effected a reduction of 22.5 per cent in the number of trains, 24.5 per cent in the average time per train, and has improved operating conditions so that nearly thirty per cent more tonnage can be handled by electric operation in 80

The electrical demonstration special which crossed the Cascade Mountains in Washington on March 5th on the first trip over the newly electrified section.

per cent of the time it formerly took to handle the lesser tonnage by steam engines. The capacity of this line has been increased fifty per cent.

Fuel Saving

An important aspect of this Western electrification is the fuel saving involved in the use of hydro-electric power. From operating results obtained on the Chicago, Milwaukee & St. Paul electrified done, during 1918, and the figures from steam operation during the same period, the following table has been compiled, showing the coal saving to be accomplished by electrification:

Total ton-miles steam	1,215,400,000,000
Reduction by electrification	146,000,000,000
Total ton-miles electric	1,069,400,000,000
Kw-hr. electric at 40 watts	42,776,000,000
Coal on basis 2½ lb. per kw-hr	53,500,000 tons
Equivalent railway coal, 1918	176,000,000 tons
Saving by electrification	122,500,000 tons

The Cedar Falls substation on the Cascade electrification of the Chicago, Milwaukee & St. Paul Railroad, showing incoming high tension feeders, outdoor 3000-volt disconnecting switches, and operators' bungalows.

The Long Lake plant of the Washington Water Power Company on the Spokane river, which furnishes part of the power for the Chicago, Milwaukee & St. Paul electrification. Thus far this company has furnished since last August about eight million kilowatt-hours.

In addition to all the advantages of efficiency, economies of maintenance, cleanliness, capacity and so forth, it is shown that approximately 122,500,000 tons of coal, or more than two-thirds the coal now burned in our 63,000 steam engines, would have been saved during the year 1918 had the railways of the United States been completely electrified. It is also estimated that the railways, so electrified, could carry one-fifth more revenue-producing freight tonnage with no change in present operating expenses or track congestion.

Electricity in Fruit Packing

(In production as well as in distribution electricity is becoming more indispensable every day. Following is an account of the part it plays in both phases of California's great citrus fruit industry, and of the increased efficiency, cleanliness and convenience resulting from its use.—The Editor.)

A new industrial plant in these days invariably means electrical equipment, and the packing house of the Honora Realty Company, recently completed near Exeter, California, is no exception to the general rule.

Arrangement of Plant —

The building itself is of exceptionally fine design, and has a main working floor space of 85 x 120 feet. The roof is supported by heavy steel trusses, leaving the working floor free from pillars and other obstructions. Three rows of saw-tooth windows facing north furnish an abundance of light and ventilation to all parts of the floor, without any direct sun rays. The windows are operated by mechanical contrivances from the main floor.

In addition to the working space there are offices, rest rooms, lockers and toilets occupying a further space of 60 x 18 feet, all of which are of the most modern type and embodying the very latest conveniences for the comfort of employes.

The main floor of the packing house is devoted to the grading and packing operations, while the basement is utilized for sweating the loose fruit, for the storage of boxes and shooks, and the making of boxes.

Interior view showing the automatic electric sorting and conveying tables and packing bins. The plant is operated with thirteen small motors, and can turn out, with a working force of only fourteen people, one thousand boxes of fruit per day. In addition to the latest in skylight effects, this room has 100 100-watt lamps with X-ray reflectors.

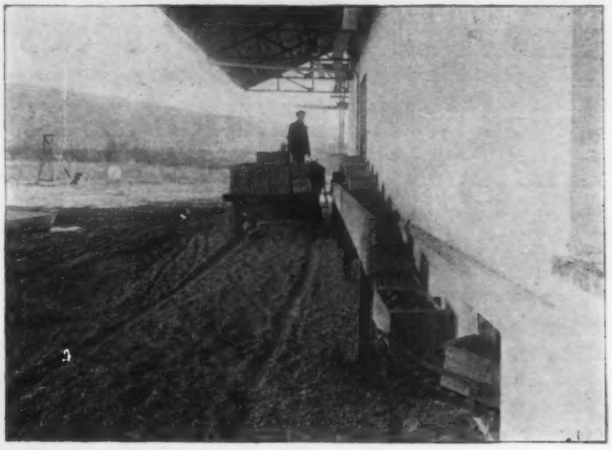
Electrically Operated Packing Equipment —

The packing equipment, installed by the Parker Machine Works of Riverside, is of the most up-to-date type. All fruit is received into the basement on a belt conveyor and piled on small platforms holding from thirty to forty field boxes, which are moved to the sweat rooms by small transveyor trucks.

Lemons, after being received in the basement, are put through one of the latest improved washers and graders, and are then conveyed to the sweat rooms. After being sufficiently cured they are elevated by means of a stack elevator to the main floor, where they are packed and placed in cars.

The sweat rooms are of the most modern type, and are 32 x 40 feet in size. There are five of these rooms, of about 2000 boxes capacity each.

Oranges, after being sweated are fed, a box at a time, on to an elevator, which dumps them on the sorting tables and automatically stacks the empty boxes.



Electrically operated receiving station. From the time the oranges or lemons are loaded on this conveyor until they are packed, they are not touched by the human hand.

The gas used for the coloring of this fruit is furnished by an outside generating plant and blown into the sweat rooms under pressure, thus eliminating danger of fire.

This house will eventually pack the output of 1100 acres of citrus groves, and in a few years will have a run of nine months per annum, as this acreage is about equally divided between navel and valencia oranges and lemons.

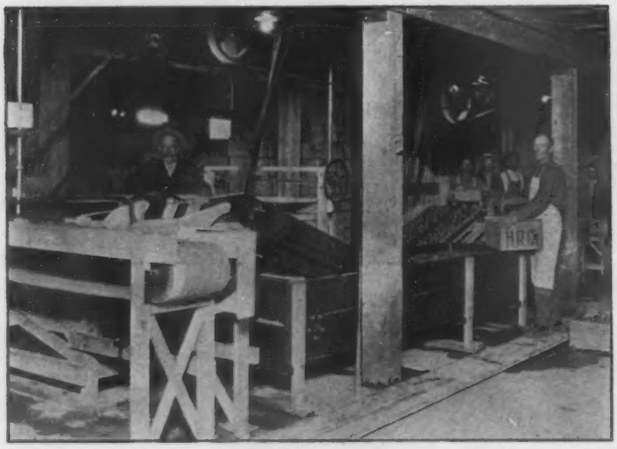
An Up-to-Date Ranch —

The Honora Realty Company is the owner of the property, generally known as the Levis-Goodale ranch, which has made this packing house possible. It consists of 1400 acres, all in citrus fruits. It is located one-half mile west of Lemon Cove and is on both sides of the Visalia electric railroad and the county paved highway, and is under the management of C. E. Goodale. It requires four Samson tractors and 24 head of mules for cultivation purposes, and 50 men are regularly employed on the ranch, independent of the packing house.

Plenty of water for the ranch is secured for irrigation by a ditch, being one of the first water rights of the Kaweah river. The supply is constant and

sure. The water is pumped from the ditch by two centrifugal pumps (one a 4-inch and the other a 5-inch) to two central distributing points, from where it is conveyed by an underground irrigation system through steel and redwood pipes to wherever it may be needed.

Mr. Goodale has now installed on the ranch sixteen electric motors and pumping plants that furnish power for every farm need.



Lemon washer and polisher, operated by electricity, and handling the fruit at the rate of 1000 boxes per day.

Twelve cottages and two cook houses, having every modern electrical convenience, are provided for housing and eating purposes, and a pool room and recreation room are maintained for the amusement of the employes. There is also a modern ice and refrigerating plant, with a capacity equal to the requirements of the entire ranch; also a blacksmith shop and two machine shops, with skilled workmen. All repairs are made at home. Two barns, garage and office building have full electrical equipment.

Mr. Goodale states that if there were to be had anything electrical that he has not installed, that would save him labor or add convenience to his home, business, farm, or pleasure he would have it.

The orange ranch as well as the packing plant depends upon electricity. Water for irrigation is pumped from the Kaweah river by electrically operated pumps.

POWER COMPANY'S SOLUTION OF FENCING PROBLEMS

BY ELMER GATES

Most western power companies find it necessary to provide some guard against cattle that wander on to their mountain properties and often do much damage to gardens and other property. In the California mountains wild hogs are very prevalent and it has been found that during one night they may do damage in uprooting property which is often irreparable. It therefore becomes necessary to develop some means of keeping them off power company property. Fences are of course provided, but the gate problem has proven a very troublesome one. The California method is usually to provide two strands of barbed wire attached to a stake which can be looped over the post at the farther side of the road. This is a source of much difficulty. Not only is it inconvenient and sometimes almost impossible to stop automobiles on the steep mountain grades, but the gates are subject to frequent injury, which is not discovered until the property is already overrun with cattle.

After many experiments, a plan was finally adopted which permits automobiles to pass without inconvenience but which effectually prevents animals from entering the grounds. This is the use of the typical railroad cattle guard, a wooden grid made of 2 by 12 scantlings spaced about 4 inches apart. The surface presented is so narrow that no animal can walk it and it presents so many pitfalls in which a foot may be caught or an ankle broken, that no animal will even attempt to cross it. The grid is made just the width of the road and sufficiently wide to make it impossible for animals to leap it. In order that it may be kept clean and not pack with dust, rendering it useless. it is made so that it fits into a stationary framework and can be removed at will.

The fence of course is brought up to the edge of the grid. In order to provide for the occasional horse-drawn vehicle, the usual gate is inserted directly adjoining. This system has proven so effective in a region where cattle abound and where the use of automobiles is so extensive, that it is being generally adopted.

The typical railroad cattle guard which is being adopted both by power companies and farmers in regions where the use of automobiles is so extensive as to make the use of gates impossible.

California's New Industry

(The United States is now producing 56 per cent of the world's cotton supply. Furthermore, the climate of California proves to be especially well adapted to the production of this material so that cotton has been added to the state's long list of raw materials. The following account of the industry's rapid growth in the San Joaquin Valley explains the important part which electricity has played in making profitable production possible.—The Editor.)

That cotton continues to play its part in the world's progress is strongly indicated by the incessant demand for cotton and more cotton. After having "done its bit" to help win the war, as the base for manufacture of high explosives, and as the fabric most adapted for airplane manufacture by reason of the very shrinking qualities which had previously made it objectionable, the more stable period of peace and reconstruction has found cotton a material so much in demand that its possibilities as a profitable investment are almost unlimited.

In the San Joaquin Valley, cotton has been added to the list of fruit, oil, grain, lumber, and dairying. It can be used to develop land not now in use, and will thus increase the production of the valley and stimulate the already mounting value of property. It can be used as an intercrop without damage to the orchard or vineyard, and possibly even with beneficial effects.

Electricity is playing its part in growing and preparing the cotton for market. It is giving valuable aid during the world cotton shortage, as a medium for speeding production. First by pumping water for irrigation, then through all the processes of ginning and milling, electricity has speeded and increased production.

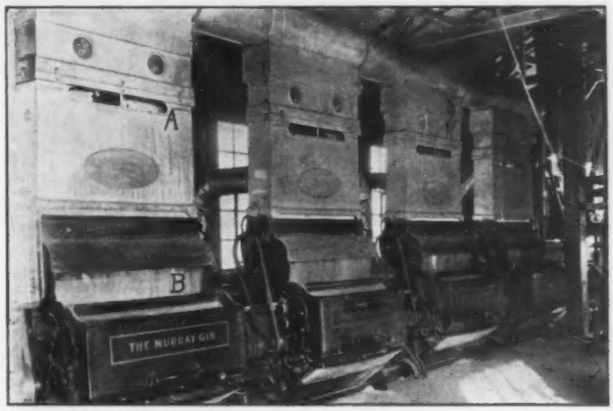
Growth of the Industry

Cotton in the San Joaquin Valley was first grown experimentally in 1913 at Kearney Park, the University of California Experiment Station at Fresno. The results of these experiments were so satisfactory that in 1918 large commercial plantings were made, and further knowledge gained under practical conditions. Land with a medium water table gives best results, and the season is sufficiently long for growing the long staple cotton, which of course demands a premium on the market. The rapid growth of the industry is indicated by the acreage of 1919, which approximated 7,000 acres. It is expected that during the present year this will be raised to treble that value. Climatic conditions are exceptionally good because of the long season during which rainfall is absent. It has been found that wet weather promotes the growth of such pests as the boll-weevil, cut-worm, locust and others. Consequently with the absence of rainfall in the long summer season, these pests are almost unknown in California. Best results are obtained where only one variety is produced in a locality. If short staple cotton is planted near a field of long staple, cross pollenization occurs to the detriment of both fields.

One of the many gins already located in the San Joaquin Valley is shown in the second illustration. This is plant No. 15 of the California Products Company, located at Fresno. The ginned bales are stacked in front ready for shipment to the mills. That the product is much in demand at the present time is shown by the fact that every effort is made to induce production from all available acreage. Offers are made for certain types of long staple cotton, which include financial assistance for growing and harvesting the crop, as well as the payment of the highest market price at time of delivery, with a guaranteed minimum price of sixty cents per pound.

Electricity Plays Its Part

After the cotton is harvested and brought to the gin it is handled almost automatically until it makes its exit in completed bales ready for shipment. Here electricity plays its part in the difficult extraction



This electrically operated gin requires only one attendant where hundreds of laborers were needed in pre-electrical days. The seeds, which can be seen scattered over the floor, are taken to the mills and pressed for the extraction of oil. Even the pulp is found valuable in cattle feeding.

of the seed from the entanglement of lint. The electrical equipment, consisting of a fifty and a twenty-five-hp. motor connected to rotary suction blowers and the gins, and a seven and one-half-hp. motor on the hydraulic baling press, was installed by the Valley Electrical Supply Company. Power is supplied by the San Joaquin Light & Power Corporation.

The cotton is unloaded from the cars outside the building by means of a suction conveyor tube which draws the cotton up and carries it to the storage, or to the gins as desired. In the gins, the saws or knives separate the lint from the seed and send each on its journey to the baling machine and the oil-press.

At the top of the accompanying illustration can be seen the conveyor tube which supplies the gins. Four of the seven gins installed are shown. The flow of cotton to the gins is regulated by the attendant so as to keep the chamber at (A) moderately filled, but beyond this the operation is entirely automatic. Falling through the opening at (B), the raw product comes in contact with the saws for short staple, knives and rollers for long staple. The seeds are separated from the lint and fall into a trough in the floor. Here a screw conveyor carries them to the

elevator for sacking, or into the adjacent building where the presses extract the oil.

After separation from the seeds the lint passes out the back of the gins and is carried by suction to the baling press. Here it is gathered in a blanket form which folds and refolds into the baling chamber. The baling press is conveniently mounted on a turn-table, so that the process is a continuous one. While the chute is filling the right hand press for the next bale, the last bale is receiving its final compression by means of a hydraulic press, before the baling straps are clamped to hold it in shape. Even the hydraulic press is supplied by electrically driven

The increasing cotton output of the San Joaquin Valley is visualized in this view of a Fresno plant. The ginned bales are here stacked ready for shipment to the mills where a minimum price of sixty cents per pound has been guaranteed.

pumps, located conveniently near the press. As soon as the bale has been strapped it is rolled out and weighed, while the turn-table is swung into position for the next set.

One novel feature of the installation is the use of steam pipes for fire protection. The steam pipes, with suitable valves, are extended into the various conveyor tubes, etc., so that in case of fire the interior of the apparatus can be flooded with live steam. In this way the fire is quickly and surely brought under control before it has had an opportunity to spread. This feature, in addition to a concrete building, reduces the fire hazard to a minimum.

MODERN PRACTICE IN SWITCHBOARD Design

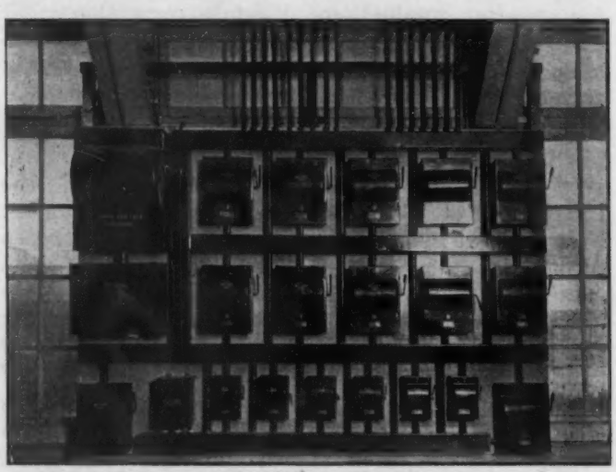
BY D. H. COLCORD

(No industrial plant can operate more smoothly than its switchboard. And because of this very fact it is necessary that switchboard design improve continually to keep pace with the rapid expansion of industrial plants. The following article tells how certain Western plants have installed, at low cost, switchboards which are flexible and at the same time provide a highly desirable safety factor and an efficient control mechanism.—The Editor.)

The two most desirable features in present day switchboard design are flexibility and safety. The unusual exigencies of production during the period of the war required constant readjustment of machinery and plant managers are still compelled to continually shift machinery and apparatus to meet new conditions created by this period of industrial expansion. Labor shortage requires the employment of operators inexperienced in handling power circuits and consequently control apparatus must be so built and installed as to insure simplicity of operation and a large degree of protection. To procure the necessary flexibility and at the same time to avoid the expense of installing the more expensive type of slate or marble boards, dead front switchboards of unit construction built of pipe, angle iron, pipe clamps, conduits, and steel plates are becoming popular.

Switchboards of this type protect the operators, as no current carrying parts are exposed on the face, and are generally constructed so that all bus-bars and all conductors on the back of the board are enclosed. Furthermore, any motor may be locked out of production at the switch, thus preventing anyone making the contact and starting the motor inadvertently while an employe is making repairs.

Dead front switchboards of unit construction are especially adaptable in small power plants for the control of motor driven auxiliaries, fans, blowers, coal and ash handling machinery, feeders, and distribution circuits. Their advantage for general industrial purposes are that they start motors from one central point, thus eliminating individual switches; they avoid the use of fuses throughout the system; individual motors can be tested and proper readings made without interfering with wiring or



Deadfront switchboards in the Paraffine Company's plant, built of externally operated Square D safety switches. This board is 7 inches high and 10 inches wide. The bottom of the board is 18 inches from the floor and there is an 18-inch platform in front of the board which not only brings the top within reach but acts as a protection from the heavy trucks commonly used in the factory.

shutting down; the operator at any machine can shut down the motor by touching a button; only authorized persons can start motors.

A switchboard that illustrates the value of a unit type of dead front switchboard is the one recently installed by the Pridham Division of the Paraffine Company's plant at Oakland, California. The board was designed for a surface type installation as floor space did not warrant setting the board out from the wall in such a manner as to allow back connections. The frame is built of 2-in. by 12-in. selected pine, surfaced and sanded, and put together with doweling pins and glue.

Telephoning from the Air

BY ROY J. HEFFNER

(One of the latest adaptations of the radio telephone is its use in reporting fires observed by aerial forest patrols on the Pacific Coast. To the war emergency, we owe the great progress which has been made in aerial telephoning, rendering such useful industrial adaptations possible. The rapid advance and the fundamental principles of operation are recorded here by a major in the aviation section of the U. S. Army who is now chairman of the Technical Department of the University of California Extension Division.—The Editor.)

Figure 1.—The fan-driven generator which supplies power for the airplane radio telephone transmitter is mounted by brackets on the landing gear strut. In this position it is in the "wash" of the airplane propeller.

ONE of the most interesting scientific advances made during the war was the development of radio telephone equipment for airplanes. It came in answer to a vital demand for better aerial communication facilities, after the trial and virtual abandonment of many signaling devices and systems, including message bags, light flares and projectors, smoke bombs, and the like. The radio telegraph was first applied to airplanes, but telegraph operators were human and made errors in code at times when errors could least be afforded. Mainly through the efforts of Colonel C. C. Culver of the Air Service, army officials were finally persuaded to consider the possibilities of the telephone.

Engineers of the American Telephone & Telegraph Company and of the Western Electric Company had held, in 1915 and 1916, successful demonstrations of transcontinental and transatlantic radio telephony, and appreciated both its advantages and its disadvantages; to them, therefore, the army turned for help. A series of conferences began early in 1917, the ultimate outcome of which was the production, in the latter part of the same year, of standardized airplane radio telephone apparatus. The best brains of the country were put to work on the vast number of problems which almost instantly arose. Patent rights were temporarily thrown into the discard; every idea of probable value was investigated, and if worthy, adopted; the final results were due to the combined efforts of many, spurred by the insistent demands of modern warfare.

The comparatively short period of time which elapsed between the first conference and the final test furnishes very misleading evidence as to the nature of the achievement. Perplexing situations came to light with astonishing rapidity. It was first necessary to devise a suitable source of constant power; then an antenna system for its radiation. The equipment must be compact, light, rugged, simple in operation, and quickly replaceable. It must be mounted so as not to interfere with the operation of the airplane, but within convenient reach of the operator. The transmitter must minimize all sounds but the operator's voice, and the receiver must be so perfected that its message could be heard above the roar of the engine and the noise of the wind.

The Problem of Power

Experts had toiled so long designing and perfecting each part of the modern airplane engine, that they refused absolutely to permit any attachments thereto. It was necessary, therefore, to establish a separate power supply for the operation of radio instruments. Small storage cells, made leakproof to withstand aerial acrobatics, proved adaptable for receiving instruments, and for certain low power telegraph transmitters, but were out of the question for radio telephone transmitting sets, which required a potential of 250 to 300 volts. For such purpose a 100-watt, direct current, fan-driven generator was developed, and enclosed in a streamline case to reduce air resistance. On army planes it was found convenient to mount the generator by means of brackets fastened to one of the landing gear struts. Figure 1 shows it so mounted. In this position the small fan is in the "wash" of the airplane propeller. A similar style of generator is used for radio telegraph work. In such type the streamline case contains not only the generator proper, but also the rotary gap, oscillation transformer, and other essential parts of the telegraph equipment.

The necessity for maintaining successful radio transmission independent of airplane speed meant that the generated voltage must be kept constant. This was accomplished by two means—a constant speed aluminum air fan, the blades of which were automatically adjusted by the action of centrifugal force—and a vacuum tube generator controlling the differential field of the generator. Using both schemes at once, fairly constant voltage was obtained at airplane speeds ranging from 50 to 200 miles per hour. The vacuum tube device working alone (with a simple wooden airfan) gave satisfactory results from 60 to 160 miles per hour. The tube was originally mounted in the tail of the generator case, but later it was found necessary to place it elsewhere, excessive breakage occurring from the jars of landing.

Figure 2 shows the electrical connections of the generator. Two armature windings produce, respectively, 25 volts and 275 volts, direct current. The field winding is constructed in two parts, main and differential, the fluxes of which oppose. The filament of the regulator tube is in series with the main field winding, and is heated by current from the 25-volt circuit. The plate potential on the regulator tube is supplied by the 275-volt armature winding, through

the differential field winding. If the speed of the generator increases, for any reason, an increase of current occurs through the main field winding and in the regulator tube filament. The flow of electrons from the filament then increases due to the rise in temperature, causing an increase in plate current.

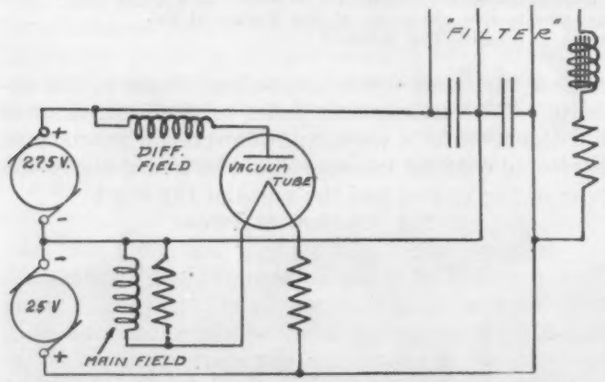


Figure 2—Circuits showing connections for regulating and "filtering" the output of fan-driven generator. The vacuum tube regular system produces practically constant voltage at airplane speeds from 60 to 160 miles per hour.

An increase in plate current, however, means an increase in the current through the winding of the differential field. Voltages and currents are so adjusted that the increase of flux in the differential field just balances the original increase in the main field, and the voltage of the generator is held practically constant. Suitable resistance, inductance and capacity are arranged to "filter" the current from both generator windings, smooth the wave form, and reduce the noise in the telephone receiver due to commutator ripples.

The Antenna Problem

Another interesting phase of the work was the construction of suitable antennas. No ground connections being possible, the radiating circuit must comprise both antenna and counterpoise systems. Among the many types tried were fixed parallel wires on top surface of upper wings and bottom surface of lower wings; fixed wires strung between points on the wings and tail; single trailing wires, unweighted, of various lengths; single trailing wires, weighted, with reels for winding and unwinding; double trailing wires, both weighted and unweighted, and closed loops in various positions.

Short fixed antennas were not good radiators; furthermore, loops were too marked in their directional effects. In this latter respect trailing antennas also gave some trouble. It was generally observed that ground stations ahead of the airplane received better signals than those on the sides, in the rear, or directly underneath. So many factors entered into the problem, however, that perplexing complications often resulted. Double trailing antennas gave as good results as single trailing antennas of much greater length, hence their fairly general adoption.

Many of the standard types of antennas for ground stations, such as the inverted-L, the T, and the umbrella gave good results for communicating with airplanes. The loop antenna made a good type for ground receiving sets used in determining the direction of the sending airplane.

It should be clearly evident from what has been said on the subject of airplane antennas that there is much to be done in this field, none of the prevailing types being without very serious objections, some of which might be sufficient to disqualify them for use in actual warfare.

The Airplane Telephone Transmitter

The problem of transmitting the human voice over a telephone from an airplane without having it completely drowned out by the noise of the engine and of the wind was uniquely solved. Two types of transmitters, one the work of the Western Electric Company, and the other that of the Magnavox Company (of Oakland, California), were developed. No mouthpiece is used, but the metal casing of the transmitter is pierced, in front, by several very small holes (three in number in the latest type). The holes are so dimensioned that they freely transmit sound waves within the range of frequencies covered by the human voice, while undesirable frequencies, such as the noise of the engine exhaust, are virtually damped out. The transmitter is worn with breastplate and straps similar to those in use by telephone operators. The covering of the Magnavox instrument has holes both in front and in back, on the theory that undesirable sound waves, hitting on both sides of the diaphragm at practically the same instant, produce no effect; whereas the voice of the operator, striking the diaphragm mainly on one side, sets it in motion.

One of the remarkable features of aerial telephony is that the operator cannot hear his own voice above the noise of the airplane, except electrically

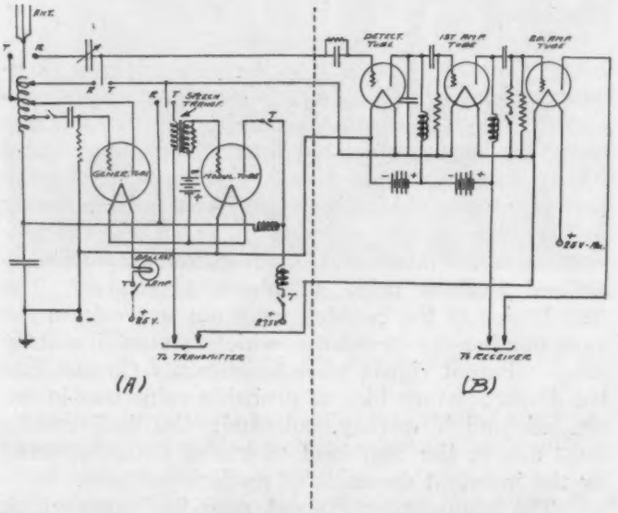


Figure 3—Diagram of the simplified schematic circuits of the SCR 68 type transmitting and receiving set

through his telephone instruments. He is therefore unconsciously tempted to put his hands in front of the transmitter to form a mouthpiece. As a matter of fact, this operation magnifies the engine noise much more than it does his voice, so that the results are far from satisfactory to the listener. The temptation to shout must also be resisted, for when the

apparatus is working well the received sound is normally quite loud.

The Airplane Receiver

Successful aerial reception of telephone messages presented the same difficulties as did transmission; viz., separating welcome from unwelcome sounds. It was easy to electrically amplify the received signals, but eliminating engine and wind roars was not so simply done, as these sounds seemed to pass through the bones of the operator's head and chest as well as through his ears. Aviators were already wearing helmets for head protection, so the first step was to install telephone receivers inside the helmets. The receivers, which were of the flat or watchcase variety, were then surrounded with soft leather cushions, oval in shape, which fitted tightly around the ears. Experiments with this type of receiver suggested the substitution of a sponge rubber cushion for the leather one, mainly for the comfort of the wearer. For high altitude flying it was necessary to include oxygen-supplying apparatus within the helmet, as well as telephone instruments.

Radio Principles Utilized

Before describing standard types of aircraft radio telephone sets produced for army use, some of the electrical principles utilized should be mentioned. The simplified schematic circuits of the transmitting and receiving set, known as the S. C. R. 68 type, is shown in Figure 3. A detailed technical explanation of these circuits is not within the scope of this article. For the sake of simplicity the transmitting and receiving circuits are shown as nearly separately as possible. The operation of a switch disconnects the radio apparatus and connects the interphone circuits, so that pilot and passenger may converse. The transmitting or the receiving side of the radio apparatus may be energized by operating a two-way switch. The generator and its regulator having been previously discussed, let us consider the transmitting circuits. Speech transmission is accomplished by the radiation of sustained waves of constant frequency, with with amplitude modulated (varied) by the action of the human voice through the medium of a telephone transmitter; thus the transmitting system may be considered in two parts—the oscillating (or generating) and the modulating. In each part a vacuum tube plays the chief role. The filaments of the tubes are fed by the 25-volt generator circuit, through a ballast lamp. The plate circuits of the two tubes are fed, in parallel, by the 275-volt generator circuit, through an iron core choke coil which functions to keep the total current supply constant; if then the current supply to one tube should increase, it follows that the supply to the other must diminish. The plate and grid circuits of the oscillating tube are conductively coupled; the antenna circuit is conductively coupled to both plate and grid circuits and receives that portion of the energy supplied to the tube which is not required to maintain the oscillations or consumed in circuit losses. Briefly, the oscillating tube fed by direct current from the generator circuit, produces high frequency alternating current to be radiated through the antenna system.

Three vacuum tubes, one detector and two amplifiers, form the basis of the receiving circuit. The filament of the tubes are fed by the 25-volt generator circuit. Plate voltages of approximately 20, 20, and 40 volts respectively, are furnished by batteries of small dry cells. Incoming signals in the antenna circuit act through conductive coupling to vary grid potential in the detector tube, and thus to vary plate current. Plate current variations of the detector tube are transmitted to the grid circuit of the first amplifying tube by means of voltage variations induced across the terminals of an impedance coil connected in series in the detector plate circuit. The process is repeated between the first and second amplifying tubes. Telephone receivers are included in the plate circuit of the last tube. A button switch is provided to cut out the last stage of amplification if desired. The "envelope" of the incoming signals, when rectified, is a reproduction of the variations produced in the telephone transmitter at the sending station.

The Standard Sets

The standard types of radio telephone sets which have been designed for the Army Air Service are contained in light, compact, hardwood boxes with hinged covers. The front of the box, which is the operating panel, is made of hard rubber or composition. The apparatus is securely mounted, vibration being reduced by the use of sponge rubber pads and washers. Connections between component parts of the complete set are made by cords, plugs and jacks.

Figure 4 shows the SCR 67 type of radio telephone, used as a ground station for aircraft commu-

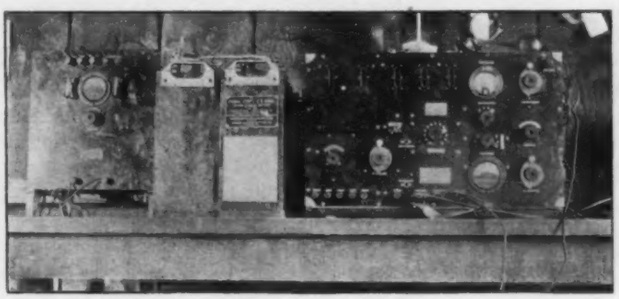


Figure 4—Ground radio telephone set type SCR 67 for airplane communication, including power panel and Edison storage batteries for operating. This is the largest and most elaborate of the Army Air Service radio instruments.

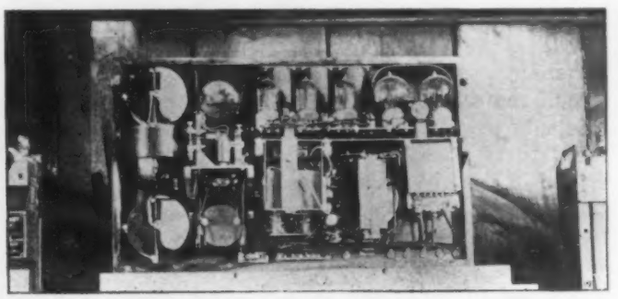


Figure 5—An inside view of the SCR 67 radio telephone set shown in Figure 4. The vacuum tubes which "do the work" are seen in the upper right hand corner. See how every bit of space has been utilized. This instrument gave excellent results from balloons, as well as on the ground.

nication. This is the largest and most elaborate of the standard sets, and includes both transmitting and receiving apparatus. The setbox is shown on the right; Edison storage cells in the center; the power panel on the left. The storage cells feed a 12-volt dynamotor, which generates 300 volts direct current for the plate circuit of the oscillator tube. The set has all the features of the type previously described, plus adjustments for coupling and for tuning both primary and secondary receiving circuits, and a filament current rheostat. The transmitting side has adjustments for wave length, coupling, etc. Meters are included for measuring filament and antenna currents; also jacks to which plug connections may be made for metering purposes. The change from transmitting to receiving circuits is made by a relay, actuated by a push button. The power panel consists of the dynamotor, filter network (as in airfan generator circuit), voltmeter, fuses, etc.

Figure 5 gives an inside view of the SCR 67 set. The three vacuum tubes in the receiving circuit and the two in the transmitting circuit are seen in the upper right hand corner. Note the compact arrangement of the apparatus throughout. The wiring is insulated by rubber tubing and covered with shellac. The SCR 7 set complete consists of the setbox, power panel, storage batteries, transmitter, receiver, control button, connecting cords, and ground antenna apparatus.

Mounting Radio Sets in Airplanes

No radio apparatus, except the generator and fan, should be mounted outside the fuselage of an airplane, on account of increasing the air resistance. The minimum amount of apparatus should be mounted inside the cockpit, and that only in such manner that it cannot possibly interfere with the operation of the airplane controls. All apparatus not actually requiring observation or manipulation in flight was placed, therefore, in out of the way spots; usually fastened to the inside of the fuselage. Great care was always required in mounting auxiliary airplane apparatus of any sort not to weaken any member of the structure by drilling, nailing, or the use of large screws. The setbox, and the interphone box when used, were mounted inside the cockpit, within easy reach of the operator. The setbox was usuallly placed just underneath the airplane instrument board, in front of the operator. The regular lamp and antenna meter were included on the instrument board.

A Forecast

The radio telephone will soon be in general use for many types of communication. Connections between radio and wire systems will be made so that a telephone subscriber anywhere may use the instrument in his office or home to communicate with a friend in the air, on shipboard, in a submarine, on a train, in an auto stage, or in some isolated locality not reached by wire lines. These statements may sound startling, but as a matter of fact, practically every one of them has been experimentally proven, and the system requires only commercial development and improvement. Very good results were attained by the writer while on duty at Rockwell Field, San Diego, in communicating from his desk telephone through the private exchange switchboard and a radio instrument, to an airplane in flight. There are many reasons why the radio telephone can probably become a competitor of the wire telephone; the mutual interests of the two will be served by their cooperation, each in its particular field.

It is sincerely to be hoped that future development of radio communication wil be encouraged and stimulated by all possible means; that legislative control will be protective but not suppressive, and that excessive commercial monopoly of the science will not occur.

HOW TO COMPUTE PROPER SIZE OF BOILER INSTALLATION FOR A POWER PLANT

BY ROBERT SIBLEY AND CHAS. H. DELANY

(To arrive at the proper size of boiler installation to meet conditions of load encountered in the power plant—either coal or oil fired—is an interesting and timely bit of information to bear in mind when design of steam-power plant installation is under discussion. Herein is set forth a direct and easy method of acquiring this data by direct computation.—The Editor.)

In order to compute the proper size of boiler installation for a given power output, we must know three factors:

(1) The Maximum output to be anticipated.
(2) The Overall efficiency of steam mains and power units.
(3) The Maximum overload to be allowed on boilers in steam generation.

Thus let us assume that 12,000 kw. are desired at the switchboard of a steam turbine installation and that the overall efficiency of steam mains, steam turbine and electric generation is 15%. What boiler capacity should be installed if the boilers are capable of carrying a 50% overload?

Since 1 hp. = .746 kw.

We proceed as follows:

$$\text{Mech. hp. required at switchboard} = \frac{12000}{.746}$$

$$\text{Mech. hp. required to be delivered by boilers} = \frac{12000}{.746 \times .15}$$

Since 1 boiler hp. = 13.14 mech. hp.,
Total boiler hp. required of boilers

$$= \frac{12000}{.746 \times .15} \times \frac{1}{13.14}$$

Since boilers are to run at 150% of rating, the rating of boilers must be

$$\frac{12000}{.746 \times 15} \times \frac{1}{13.14} \times \frac{1}{1.50} = 5430 \text{ Blhp.}$$

In following the above illustrative example it is to be remembered that the efficiency, including auxiliary losses and every other feature in power plant design, is usually more like 10% than 15% in the modern power plant.

Service Devices for the Electrical Shop

(All the theories of merchandising ever propounded are not as significant as a half-dozen original devices successfully applied by a progressive establishment. Following are a few interesting features of the Valley Electrical Supply Company's business which not only illustrate the type of service being rendered by contractor-dealers to their customers, but suggest a wide range of possibilities open to the electrical retailer in planning out the details of merchandising work.—The Editor.)

"WHAT THE OTHER MAN DID" sometimes helps sell to the present customer. If it were possible to take the prospective purchaser around to show him the effective house fixtures which have been installed in the new Jones' home, or the wiring job for the Blank Manufacturing Company with which they are so satisfied, it might be simpler to come to exact terms. However, neither the dealer nor the customer has time, and Mrs. Jones would not care to be bothered daily to serve as an advertisement for a firm she paid well to do her work for her.

Much the same result may be obtained by the generous use of photographs. Particularly in the case of business firms which have remodeled their quarters and had new fixtures put in, or who have had an extensive electrical motor installation added to their equipment, the firm is prepared to have commercial pictures taken of the improvement. They

A photograph of Warner's Jewelry Store, Fresno, California, after it had been remodeled, with new fixtures installed by the Valley Electrical Supply Company. This is the type of picture which will interest another merchant about to improve his own store lighting.

are more than glad to have a copy of these pictures in the hands of the electrical contractor who has done the work—would in fact be pleased at any publicity he might secure for the installation in the local press or in technical magazines. In some cases where they would not otherwise have thought of a photograph, they will be glad to furnish one if they know good use can be made of it.

Such a photographic record of industrial installations which the electrical contracting firm has carried out—of effective store window illumination for which it is responsible, or store fixtures it has supplied—will make a store photograph album which will be the best of salesmen.

THE MAN ABOUT TO BUILD A HOME is the best possible prospect for electric wiring. The best any contractor could hope to do would be to talk with each prospective home builder before he had made up his mind just what he wanted to do in that regard and have a chance to advise him as to good methods of wiring and the making of proper provision for the electrical appliances which he may wish later to make use of in his household.

Fortunately the building regulations of our various communities provide that all building permits shall be published in the newspaper, so that a complete record is at hand of just such prospective builders. The Valley Electrical Supply Company of Fresno, California, takes advantage of this psychological moment to write this list of prospects, calling their attention to the need for planning the illumination of the new home and sending them a booklet on the "Comforts and Conveniences of Electricity in the Home." The letter which accompanies this literature is as follows:

Dear Sir:

Inclosed you will find a small booklet from which we feel sure you will be able to get much valuable information that we know will help you, and in many cases you will be able to correct mistakes that are invariably made in planning the wiring and illumination in the home.

The services of our engineering departments are at your command.

Very truly yours,

The booklet is one of those provided by the Society for Electrical Development and not only gives suggestions as to what illumination is desirable in the various parts of the house, but also contains figures in the back as to what percentage of light is absorbed by shades of different colors and what reflection can be expected from different wall papers,

A booklet which carries the electrical message to the home builder, impressing him with the importance of adequate wiring and suitable equipment.

wisely suggesting to the owner that there are technical problems involved even in the matter of selecting fixtures, on which it might be wise to have expert advice. A list of electrical household labor saving devices is appended in the rear, with a very brief description of what each is designed to add to the comfort of the housewife. The name of the Valley Electrical Supply Company is of course, signed to the letter and appears on the front page of the booklet, but otherwise the home-builder is left to his own inclinations in the matter of selecting the electrical firm with which he wishes to deal.

This letter is followed by a second a little later which calls especial attention to the firm's fixture department and offers to send a representative to call on request. This runs as follows:

We understand you are building a new home, and know that shortly you will be interested in the lighting fixtures.

You probably already know that the lighting will need proper attention, for lighting makes or mars the decorative effect of your home. Our representative will call on you personally, if desired, and will gladly give suggestions and quotations.

If it is convenient, we would like you to visit our showroom, which offers an almost unlimited selection of modern fixtures in an adequate variety, both as to design and cost.

Hoping to be able to serve you in the near future, we are,

Yours very truly,

A third letter form is also available in case the correspondence is carried further, or for use in special cases for which it seems to be more appropriate:

Dear Sir:

I have been very much interested to hear that you are building a new home, and I want to say a word to you about your lighting fixtures—actually the most important comfort-factor in the house.

You are going to live with these fixtures. You are going to spend your evenings with them. Your lighting will be the most conspicuous feature of your home on those occasions when you entertain guests in the evening—when you give a party—or they will be a disappointment. And you want no disappointment in this house if you can help it.

The only satisfactory way for you to choose your fixture is to come right here to our fixture store and see all the designs we have here. You will find ample selections within the price you want to pay, and we can make suggestions as to finish and glassware that I know will interest you.

Won't you make a point of it to come in here the next time you are in the neighborhood? We can show the fixtures and make suggestions we are sure will benefit you and also lend you the assistance of our lighting experience.

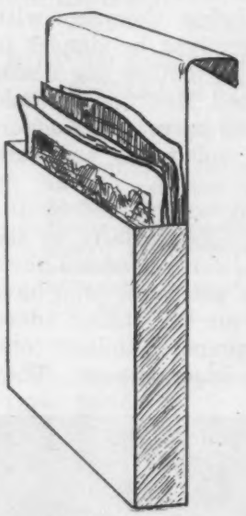
Very truly yours,

Very good response has been received from prospective builders to these letters, and it is felt that even where nothing can be directly traced to their influence, they often lead to later orders. The owner of a home is the best of all prospects for electrical appliances, and although he may conceivably leave the choice of an electrical contractor to the man who is handling his building work, who may have other affiliations, he will have read the booklet and profited by it, and when at a later time he comes to select the appliances for the new home, it will very likely be the Valley Electrical Supply Company to which he comes.

KEEPING SILK LAMP SHADES ON DISPLAY and yet not having them collect dust so that the customer is unwilling to accept them as fresh stock, is a problem which gives considerable trouble at times. It is possible to display some few of them in glass enclosed cases, but the space which can be devoted to these is of necessity limited. Throughout the western valley districts, where the summers are dry and hot, there is always dust to contend with, so that mere dusting will not answer the problem.

The Valley Electrical Supply Company has satisfactorily overcome the difficulty by the use of tracing paper covers for lamp shades. These are made within the establishment to fit the different types of shades and look most attractive, as well as serving effectively to keep off the dust. The tracing paper is translucent and permits the coloring of the shade to show faintly through. On the other hand, the linen is stiff in its texture and does not require hemming to give a neat finish at the bottom and edges. There are some instances of special lamp shades which require new shields made every so often, but on the whole an outfit of such shields will meet all needs of general stock.

WASHING MACHINE FOLDERS are valuable adjuncts to any sales talk. Not only does a supply of such literature close at hand give the customer something to read in the case of having to wait, but it enables the salesman to show from the illustrations just how the machine is put together and set up in the home—and gives him something to leave with the customer when she goes out of the store. In consequence it is customary in washing machine merchandising to have such literature conveniently at hand in some form of rack or loose upon the cover of the machine. There is a distinct advantage in having it in some way connected with the machine, as the customer is much more likely to pick it up of her own accord. A neat little holder which answers this need, without leaving the folders to be scattered about, looking untidy and interfering with the free opening up of the machine to show operation, is to be had in the shape of a little metal box which attaches with a metal hook to the side of the washing machine. This is attached with a metal hook which fits flatly over the upper edge, interfering in no way with the closing of the cover and yet conveniently at hand for all purposes.

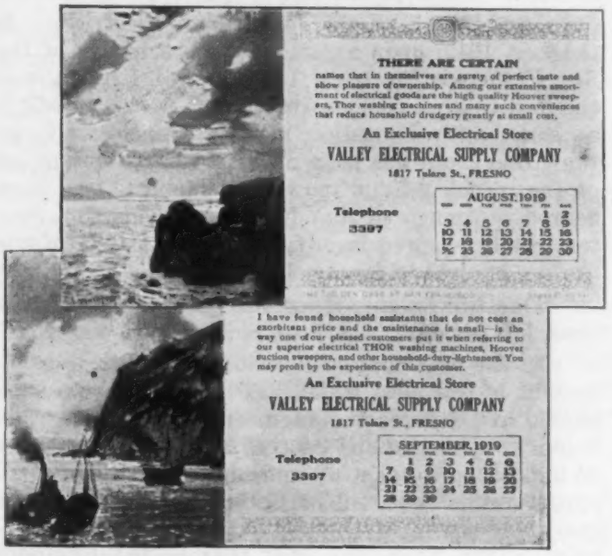


A convenient holder

MONTHLY BLOTTERS are sent out by the Valley Electrical Supply Company to keep customers familiar with their name as a household word. These bear the calendar for the month and an appropriate message for the season's electrical needs, as well as an artistic colored picture of some beautiful landscape. May and June offer the summer's opportunity for the purchase of electric fans; July is devoted to electric equipment for the kitchen and home which will lessen the suffering from heat; October finds a reminder of the value of vacuum cleaners in fall housecleaning and December, of course, suggests electrical gifts for the season.

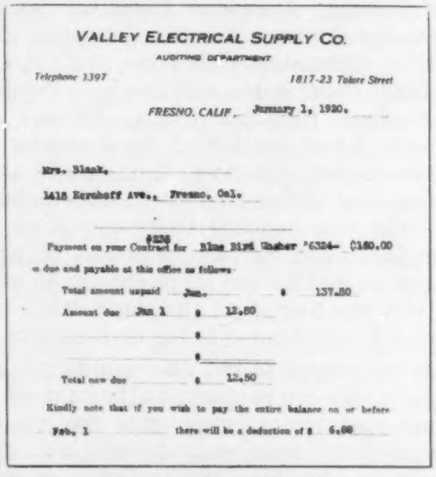
These monthly reminders have the greater advantage over a yearly calendar in that they come freshly to hand twelve times during the year and do not become forgotten through familiarity. A blotter has the special advantage of being actually put to use. There are few homes where a blotter or a calendar does not find immediate use—and the com-

bination of the two finds its way at once to the household desk. The admonition is thereafter constantly in view, and smoothed over with the householder's hand once or twice every day. This custom of sending out monthly blotters soon comes to be recognized and appreciated by those on the mailing list, who look forward and count themselves in consequence definitely the customers of the store which keeps them so constantly in mind.


THERE ARE CERTAIN
An Exclusive Electrical Store
VALLEY ELECTRICAL SUPPLY COMPANY
1817 Tulare St., FRESNO
Telephone 3397
AUGUST 1919
I have found household assistants that do not cost an exorbitant price and the maintenance is small—is the way one of our pleased customers put it when referring to our superior electrical THOR washing machines, Hoover suction sweepers, and other household-duty-lighteners. You may profit by the experience of this customer.
An Exclusive Electrical Store
VALLEY ELECTRICAL SUPPLY COMPANY
1817 Tulare St., FRESNO
Telephone 3397
SEPTEMBER 1919

Two of the artistic blotters sent out to customers every month, each bearing the calendar for the month, an electrical message and the company's name.

A SIMPLE METHOD of following up time contracts on washing machines is in use by this company. The contract is of course signed and recorded at the time of the sale—and strictly speaking, no further bills are required. It has been found desirable, however, to send out monthly statements to all holding such contracts, stating the amount still due, the amount due as a monthly instalment and the



VALLEY ELECTRICAL SUPPLY CO.

AUDITING DEPARTMENT

Telephone 3397 1817-23 Tulare Street

FRESNO, CALIF., January 1, 1920.

Mrs. Blank,

1418 Kerckoff Ave., Fresno, Cal.

#236

Payment on your Contract for Blue Bird Washer #6324- $180.00

is due and payable at this office as follows:

Total amount unpaid Jan.	$	137.50
Amount due Jan 1	$	12.50
	$	
	$	
Total now due	$	12.50

Kindly note that if you wish to pay the entire balance on or before Feb. 1 there will be a deduction of $ 6.00

The monthly statement of a washing-machine time contract, showing the customer the amount which can be saved by early cash payment.

amount which can be saved by the customer by a payment of the entire sum in cash. This latter statement has been found particularly useful in securing the payment of contracts before the scheduled time. A discount is given up to the last two payments, amounting to five per cent on the money which would otherwise be outstanding. This saving is stated in actual cash terms, however, rather than in per cent, for the reason that it appears a more concrete saving to the customer, usually a woman, to save a deduction of $5.00 from her bill, than 5%. It has been found that this monthly opportunity to save money by paying up the balance due is often taken advantage of and greatly simplifies the problem of prompt collection.

The importance of prompt collection is often overlooked by contractor-dealers in the press of business—but the tying up of capital in unpaid bills is an extremely unprofitable form of investment. It must be remembered that no sale is complete until the cash is in hand.

ENGINEERS OF YESTERDAY — 19. VOLTA

A Series Compiled by A. L. Jordan

Who "laid the foundation for an art that was in time to revolutionize the industrial world?"

Alessandro Volta (1745-1827) announced his invention of the "voltaic pile"—a copper-zinc-moistened cloth series—and the "crown of cups"—zinc-copper strips in cups of dilute acid.

Here began the story of current electricity; and this discovery ranks with that of Faraday and Henry—the production of current by other than chemical means—made about 30 years later.

Volta occupied the chair of physics at the University of Pavia, Italy, from 1779 to 1804, and had made other discoveries before this one. In 1775 he brought out the electrophorus, the forerunner of our modern Wimshurst, Toepler-Holtz, or other static induction machines. One form of electrometer is credited to him, and during his controversy with Galvani he showed a number of physiological effects; for example, that two metals in the mouth caused a "taste," and a weak current through the eye produced "flashes of light."

The invention of the voltaic battery placed in the hands of the chemist a new weapon of discovery, and in the same year (1800) Carlisle and Nicholson, in England, had decomposed water, proving the resulting gases to be oxygen and hydrogen. Soon afterward Davy produced by electrolysis the metals sodium and potassium, and the years which followed are filled with the record of the numberless things which Volta's "electric fluid" has done and is still doing.

The Engineer and the Electrical Development Building

(Herein is to be found a preliminary survey concerning cost and possible rentals that may be derived from an Engineer and Electrical Development League Building. This survey has been undertaken by the Journal of Electricity, and the advice of the best real estate and architectural skill in San Francisco has been consulted. It is, however, to be taken only as a preliminary from which more accurate data can be compiled later.—The Editor.)

In arriving at the cost of the building proposed, it is assumed that the building is to be a fifteen story structure of the most modern and up-to-date design located in a commanding position in San Francisco peculiarly adapted to engineering and electrical development interests. In order to gather more concrete information, a specific lot and cost were ascertained, and all data computed from that basis. The one item that is perhaps more uncertain than any other in the following schedule is that of the question of maintenance, which, due to uncertain labor conditions, has been very difficult to ascertain. However, the basis of one dollar per square foot is the outside figure given to us by one of the largest and best kept office buildings in San Francisco. Assuming that a rental of eighteen cents a foot is to be charged, and making no allowance for revenue from the basement, which, by the way, has already been applied for by one prominent publishing concern for press rooms, the income that may be hoped from such a building is in the neighborhood of 5% per annum. On the other hand, should a rental of twenty cents per square foot be charged, an unusually attractive proposition is open for the investor. Assuming that 70% of the structure is bonded at 6% returns, the remaining subscribed to by proposed stock company of 330,000 shares would have a possible revenue return of something over 8½% on the investment.

ESTIMATE ON ENGINEER AND ELECTRICAL DEVELOPMENT BUILDING, ON BASIS OF 20 PER CENT RENTALS

Lot 80 x 120	Building, 15 stories	
Cost of lot	$ 130,000.00	
Construction	900.000.00	
Total cost,	$1,030,000.00	
5280 sq. ft. area per floor of upper floors.		
8500 sq. ft. area of ground floor.		
Income:		
14 floor, 74,000 sq. ft. @$2.40		$177,600.00
Ground floor, 8,500 sq. ft. @ $3.50		29,750.00
Total yearly income		$207,350.00
Expenses:		
Taxes @ 3%	$ 15,000.00	
Insurance @ $2.50 per M.	1,750.00	
Vacancies, 10%	18,534.00	
Maintenance @ $1 per sq. ft.	82,500.00	
Depreciation @ 2%	18,000.00	
Total yearly expense	$135,784.00	$135,784.00
Yearly Profit:		$ 71,566.00
Interest on Proposed Indebtedness:		
$700,000.00 @ 6%		$42,000.00
Net Return to Proposed Company:		
330,000 shares at par value of $1.00		$29,566.00
(Showing return of 8.65% on investment)		

Insistent demand comes from all parts of the West for the establishment of a center of engineering activity in San Francisco, the business and financial metropolis of the West. An Engineer and Electrical Development Building is urgently needed.

The Editor of the Journal of Electricity, in October, 1917, upon assuming the presidency of the San Francisco Electrical Development League, was the first to urge the construction of such a building, at some central location in San Francisco. Since that time there has been much profitable discussion of the problem, and powerful support has been asured—so much so that if sufficient long-time rentals can be secured in advance, the financing of the project is already practically assured.

The time for discussion has passed. Now is the time for action.

At the beginning of a period of industrial development in the West which has hitherto been unsurpassed, it behooves the engineering professions and trades to organize and centralize, so that they may be in position to take full immediate advantage of all opportunities that will be presented. Let there be one great center of engineering thought and enterprise in San Francisco. Let that be the Engineer and Electrical Development Building—to be advertised everywhere in the West as the first place to seek in order to get into intimate touch with the active agencies of engineering endeavor.

Such a building would gain the financial support of such organizations as the Engineers' Club of San Francisco, American Institute of Electrical Engineers, American Society of Mechanical Engineers, American Society of Civil Engineers, American Institute of Mining Engineers, American Institute of Architects, Commonwealth Club, Illuminating Engineering Society, American Chemical Society, the Electrical Development League, California Electrical Cooperative Campaign, California State Association of Electrical Contractors and Dealers, Pacific Division of National Electrical Supply Jobbers Association, Pacific Coast Section of the National Electric Light Association, Electrical Contractors and Dealers' Association of San Francisco, and similar organizations. In this building there should be suitable meeting-places and conference rooms to suit their needs, and an auditorium large enough to accommodate a joint meeting of all the engineering societies, including full arrangements for dining-room service.

This movement to get all engineering interests of the city under one roof merits the support of engineers and contractors; merchants dealing in engineers' equipment, supplies and materials; manufacturers' agents; technical publications. Engineering commissions and executives of the State and National governments should be invited to centralize their activities by securing offices in the Engineer and Electrical Development Building.

Office Records—Their Filing and Indexing

BY IRENE WARREN

(The filing system should be adapted to the type of material handled. In cases where it is necessary to bring together a number of papers that are not easily alphabetized, or documents which must be kept in the order in which the transactions are handled, the numeric system is frequently found convenient. It is described here in the sixth article of the series by the Director of the Chicago School of Filing and Indexing.—The Editor.)

THE NUMERIC SYSTEM

The alphabetic plain, the alphabetic with both single and double number codes, and the geographic systems are all alphabetic or based on the the alphabetic arrangement, and they are so planned that one may go directly to the files and get what he wants without consulting an index. It is an indirect method and one can never get materials from the file without consulting the alphabetic card index which serves as a key to the location of the materials.

Every regular correspondent is given a number and the numbers are consecutively assigned to the correspondents as they develop. The test for determining who the regular correspondents are, is the same as in the other systems. It will be seen at once that there are no limits to the extent to which such a system may grow without renumbering of any sort.

Arrangement of Guides and Folders

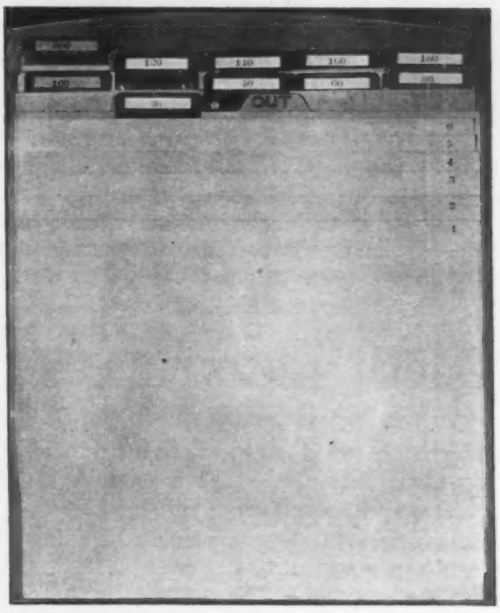
The guides used are usually metal tipped with the numbered inserts. The divisions by hundreds —100, 200, 300—are made to stand out clearly by placing them on colored paper inserts on guides which are in the first position. There is a guide for every twenty numbers and these are staggered across in the second, third, fourth and fifth positions, leaving the first position for the hundreds.

The letters from the regular correspondents are placed in straight edge extension top folders consecutively numbered on the upper right hand tab. A supply of unnumbered folders is kept on hand so that when a correspondent develops sufficient correspondence to demand another folder, the proper duplicate number may be placed on it as well as the dates or whatever other marking is desirable.

When a number is assigned to a regular correspondent, the correspondent's name and address are written on a card bearing the same number. These cards are arranged in an alphabetic index. In large systems the address is needed for identification of the firm as many have the same or similar names. In small systems the cards are often used for the mailing list.

Marking Letters

The letters are marked in exactly the same style as in the alphabetic numbered systems, the name under which a letter is to be filed is underscored, the cross references indicated, and the important word or words in the letter are encircled. The letters are then roughly sorted alphabetically by the name of the firms so that firm names may be more easily looked up in the alphabetic card index and also so that several people may work on the numbering of the letters at the same time. Each name must be looked up in the card index to get the correspondent's number which is assigned to the upper right hand corner of the letter. There is a check against assigning a wrong number to a new name, because the card taken from the package of unused cards consecutively numbered, and the first unused numbered folder must bear the same number. When the folder is put in the file it must follow consecutively the last folder-number filed. The correspondents' numbers remain the same, year in and year out,



Showing arrangement of guides and folders in the file where the numeric system is employed

with the exception of changes noted later. In some firms, as soon as the file clerk assigns the number it is sent to all those keeping records throughout the firm, so that the customer is known by the same number in the order department, on credit memoranda, on ledger cards, and on various other records.

The cross references for this system are all made in the card index. The various words under which cross references are made are listed on the main entry card.

When the letters are properly numbered, they are sorted by the numbers and made ready for filing. The size of the file determines whether time will be saved by having one or more sortings before the letters are finally filed.

It is a dangerous thing to re-use a number until such a time as the clerk is confident there can be no duplication in current or transfer files.

The folders for the miscellaneous correspondents may be treated in one of two ways. A separate alphabetic plain file may be set up; or, the letters

may be classified by subject and each subject assigned a number exactly in the same fashion as numbers are assigned to names. In many firms, the miscellaneous letters may easily be classified in about a dozen groups.

The numeric system is adapted to:

(1) Cases, contracts, data of various sorts, drawings and other materials where it is desirable to bring together a considerable number of papers into groups that are difficult to describe in alphabetic terms.

(2) Such materials as trade catalogs, that need to have many items or parts brought out in each catalog by means of an alphabetic card index.

(3) Orders, invoices, leases and such materials as it is desirable to keep in the order in which the transactions develop.

The numeric system is less used than in years past because it is much more convenient to go directly to the files for information. There is a certain sureness about this plan, however; the firm has the same number year in and year out; all its materials go under this number and cross references to other names, subjects, or geographic locations are made in the card index. One trained file clerk may mark the letters and attend to the cross references, and assign the rest of the work to very inexperienced clerks with very little education, so long as they are accurate. The clerk may easily attend to all calls for material by consulting the card index, and sending the untrained helpers to get the papers.

Western Ideas

HE WHO GRASPS OPPORTUNITIES stars in the advertising world, as in every other field of life. The ingenious dealer will take advantage of all unusual chances to put his shop before the public.

At one time there happened to be a big chunk of concrete in a vacant San Francisco lot. On this the sign was painted, "Easier Seats Across the Street." On the other side was seen the furniture store, with chairs and davenports attractively arranged in the window.

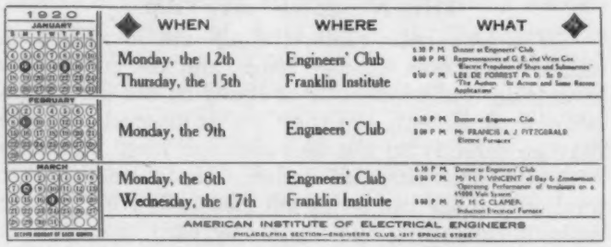
Another electrical dealer recently had the misfortune to have his window broken. He capitalized this event by means of a card tacked to the wooden boards protecting the window.

"WE SIMPLY CAN'T KEEP THEM OUT—

People are so anxious to buy our Electrical Goods that they fall head over heels into our window."

PRINTED REMINDERS are used by almost every organization under the sun, for there never yet was a society whose members could remember when and where to meet without being told at frequent intervals. The chief problem is to have the printed reminder in a form which will be most likely to make the members obey that impulse and at the same time will involve the minimum of trouble for the overworked secretary.

The blotter idea employed by the Philadelphia Section of the A. I. E. E. is a happy thought. Everybody uses a blotter. Moreover, everybody except the very absent-minded man uses it with the blotting side down and the printed side up, so that the schedule is presented to his gaze every time he blots his signature. The printed schedule of this engineering society includes not only dates, times and



The blotter which serves as a successful A. I. E. E. reminder

places but programs, too, for several meetings ahead, and if only the well-meaning member will keep one of these useful blotters on his desk he is not likely to miss something he really wanted to hear, and he knows about it far enough ahead to keep the date open—which is not always the case when notification depends on the secretary's postal card.

EVEN A SCRATCH PAD may be employed as an informal publicity agent. A San Francisco engineer, realizing how often an engineer has to make a sketch for his prospect, uses a special pad for the purpose. The inside of the folded sheet is blank for the sketch while the outside bears his name, address and telephone number, so that any kind of a memorandum handed to anyone has the same effect as the leaving of a business card.

This idea might well be taken up by electrical men other than engineers. A contractor-dealer making a notation for a customer frequently uses the back of one of his bills or order blanks, and though this serves to carry the name of the firm to a prospective customer, the special slip which has nothing else printed upon it but the name, address and telephone number, is a more dignified and effective thing. The psychology of impressing a name on the public mind is one of the secrets of advertising, quite apart from the fact that without the little printed memorandum the prospect might easily forget the name of the store.

An engineer's name and address printed on every sheet of his scratch pad serves as a useful memorandum for his client

The Ready to Serve Element in Public Utility Rates

BY C. E. GRUNSKY

(The presence of a public utility in any district increases the business possibilities of that district to such an extent that the entire community, and not merely the customer, shares in the benefits. The following article points out the equity of adjusting rates with this fact in mind. The author is a well-known consulting engineer of San Francisco and a recognized authority on questions of public rate-fixing.—The Editor.)

Public Utility Rates are not necessarily uniform to the individual rate payers. The rate payer gets more when he is hauled up a hill a mile by a railroad than when he is transported a mile on a level road and yet the charge on any particular railroad is generally the same for these services. The man who lives on a hill in an urban district may get his water under low, unsatisfactory pressure while his neighbor at the foot of the hill, at the same cost, gets a satisfactory service. But the rates as fixed are intended to apply to average conditions in various classes into which those who are served by any utility are, for convenience, divided. The approximation to fairness meets the practical requirement. But, it may be asked, does the rate favor the large consumer? On the unit basis he usually pays less than the great mass of rate payers. The illustration will be equally apt if what the large consumer of electric energy pays, be compared with what electric energy costs the small consumer.

There are several reasons for such apparent inequalities in the rates. Thus, for example, let it be supposed that it is to the interest of the whole community that the establishment of big business be encouraged and that one of the elements to make an urban district attractive for such business and particularly for industrial establishments is cheap water, and let it be further assumed that the supply of water is abundant, that provision having already been made for future demands, there is more water available than actually required. Under such conditions the immediate operating expenses would increase the net earnings of the water company and would, therefore, have the effect of reducing rates. In such circumstances, a graded rate is fair. Giving the large consumer a special, lower than average rate, is, therefore, sometimes legitimate.

And, again, everybody, in the spirit of fairness, is willing to pay for what they get, provided only that the same treatment is accorded to all alike. Consequently, there is rarely any objection to a basic charge for such services as keeping a house connection and a meter in order, reading meters, making out bills and collecting. The cost of rendering such services is independent of the amount of water or gas or energy consumed on the premises which are served. But if for such services, a basic charge is made and to this is added a further charge, proportional to the amount of service rendered or commodity furnished, the small consumer, on the basis of his bill, will find himself paying a somewhat higher price per unit of service or commodity than the large consumer.

It should perhaps be stated in this connection that public utilities generally make provision for prospective business. Their capacity for service is determined by the requirements of the near future rather than by the immediate demand. Their management looks forward to a time when there will be more industries, more and larger hotels and office buildings, fewer vacant lots, and in general greater business activity and greater demand for the services or for the commodities which the various public utilities supply. Each utility, therefore, increases the potential value of every lot and of every business within the territory which it serves. The street car line, the water and the gas main, the telephone line in close proximity to a lot, whether vacant or improved, add value to the lot. When a public utility is established, an indirect service is thus rendered to a portion of a community or to the whole community which, in the fixing of rates, is generally ignored. The whole community having thus been benefited, why should not the community lighten somewhat the rate payer's burden? The principle is sound; but against its application there will be protest. It is so easy to say, let those who use the electric energy, or the water or gas or street car transportation pay the whole cost thereof, forgetting the indirect but material benefit, reflected in general prosperity, which the utilities have brought to the community. If publicly owned, the utility would pay no taxes. Why, then, should the rate payers served by a privately owned utility pay the tax increment which appears in each bill they pay and in each nickel they drop into the conductor's fare box? Or, the question may be asked, why should not a part of the operating expense of the public utility be paid out of the public treasury, as, in a small measure, is done when a city pays an annual fire hydrant charge and pays liberally for water for public buildings and grounds? And, why should the city accept free telephone service, when it thereby puts a burden on the rate payers?

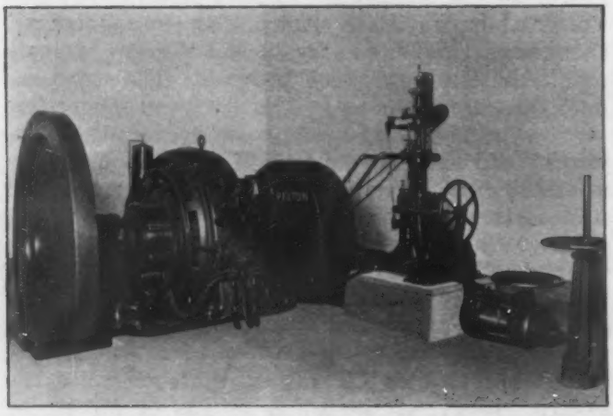
It is a short-sighted policy which permits a community thus to evade a legitimate obligation. But it is the the common practice, and few, in fear of advocating a high tax rate, have the courage to point out its unfairness. It seems all right to those who have not analyzed this question to let the municipality dodge the obligation which it owes to the utility for being ready to serve, and thus place some additional burden on the party who must have the service, and who is not likely to complain—that is, the rate payer. There are some, too, who go further and claim that any ready-to-serve charge is unjust. In the light of what has here been written, this question need not be argued. But it will always be proper to inquire as to what is a fair ready-to-serve charge. Each case in this respect must be judged by the facts which apply.

Water Power Development for Small Plants

BY CHAS. H. TALLANT

(In districts which are outside the congested industrial centers there is frequently a demand for small or isolated hydraulic units which present special problems of design and installation. Following is a discussion of the types of units best suited to particular conditions, and the factors governing their selection.—The Editor.)

Much has been written from time to time about the proper selection of the hydraulic units for large central station hydroelectric plants, but comparatively scant attention has been paid to the subject from the viewpoint of those interested in small or isolated plant construction. The problems of the prospective builder of a small or isolated plant are often more complex to him than the problems of large construction are to the central station man.



Small isolated plant unit equipped with heavy flywheel to neutralize speed fluctuations

The first considerations in investigating the possibilities of an isolated installation are of course the hydraulic conditions, volume of water, head and length of pipe line, and the probable market for the power to be developed. While these two considerations are not inseparably linked together, they nevertheless bear a close relationship to each other and exert a strong influence upon each other.

A limited water supply might be utilized to supply a small, already developed market, while operations on a larger scale, in which additional adjacent water supplies were utilized, might lead to the development of a much larger and equally profitable market, without too greatly increasing the capital investment. On the other hand, a market might already be developed that could accommodate power development on a small scale or on a large scale, depending on the extent to which it was preferred to carry the development. Obviously this latter case might materially affect the general design of the power house equipment and the performance of the equipment which would be provided by that design. The type of hydraulic prime mover—impulse or reaction turbines — might be affected also, but this is almost always definitely fixed by the hydraulic conditions.

Assuming that the hydraulic conditions are determined, the next step is to determine the type of hydraulic prime mover to use. It is well known that, as now constructed, hydraulic prime movers are confined to two types, the impulse or Pelton type and the reaction or Francis type. Just where the dividing line in choice of type is located is a matter of some discussion, though there is not a wide area of overlapping. The impulse type is essentially a high head, small volume unit, and the reaction type a low head, large volume unit. The distinction may be more definitely outlined on the basis of "specific speeds," a uniform type characteristic which takes into consideration the variables of head, horsepower and speed. A simple formula is

$$N_s \text{ (Spec. speed)} = \frac{\text{r.p.m.}}{\text{head}} \sqrt{\frac{\text{hp.}}{\text{head}}}$$

For values of specific speed up to 9, the impulse type is usually favored. For values above 11, the reaction type, while the values between 9 and 11 represent the field in which either type is permissible, depending on other considerations of local expediency.

Influence of the Market for the Power on the Prime Mover Design

As stated above, the market for the output of isolated plants has an important bearing on the general design of the plant equipments. It will be particularly important in its effect on the provisions for speed regulation and on the provisions to be made to carry out this regulation to the necessary degree. For example, if the load is to consist almost entirely of a lighting load, with a few scattered small motors, the load curve will be fairly smooth and the changes easily within the control of the turbine governor. In such a case the question of speed regulation is a simple one.

The generating unit at the Ione power plant, constructed with double duplex nozzle—actually four nozzles in all. The installation is for the Preston School of Industry, a state institution of California, where a small stream without appreciable storage capacity is made to furnish power and light to the institution.

If, however, the plant is to handle a mine or dredger load in addition to the lighting and small motor load, the question of speed regulation becomes

of much more importance. The mine load may include the power for a large hoist. The dredger load, with the heavy scrapers brought practically to a standstill on boulders and then as suddenly returned to normal speed as the boulders give way, approximates the mine hoist load with its sudden starts and stops of the loaded cages. Obviously either of these conditions requires a design that will fully provide for the maintenance of successful speed regulation.

An installation made for exactly this set of conditions is that of the Tin Bentong No Liability tin mine in the Straits Settlements. A 1200-hp., 435-ft. head, double overhung impulse turbine, direct connected to a 1000-kva. generator, furnishes the power for operating the dredges and for the lighting and utility loads. The dredge load takes a considerable part of the total output of the generating unit and during operation puts a sharply fluctuating demand on the unit.

The turbine is a double nozzle unit, using considerable water at the low head, and is equipped with hand operated needle nozzles and stream type jet deflectors. It was necessary, however, to provide in the design for a heavy flywheel to be mounted on the shaft, to take care of the regulation during the sharp fluctuations consequent upon the dredge operation. A delicate governor would respond too quickly and would not accomplish the necessary regulation unassisted when the heavy and sharp peaks and valleys occur.

The unit illustrated is that of a small direct-connected generating unit equipped with a flywheel, for use under conditions somewhat similar to the mine load, but requiring much smaller capacity and less sturdy construction.

Considerations of the market and its effect upon design and regulation becomes of further importance when the power required for the hoist, dredges, pump or similar large units approaches the ultimate capacity of the plant which supplies the power. Such a load on a central station network would be insignificant, as far as regulation is concerned, but on an isolated plant it might constitute 50% or more of the plant capacity, and it would be a very decided factor in the regulation. For this reason it logically follows that to give the same service as the large power company the small plant must have very definite provision made in its design for carrying such loads successfully.

Quantity of Water Available

Under conditions where there is an ample supply of water for all the power requirements of the isolated plant, no consideration need be given to the question of providing water storage or of water economizing devices in the turbine equipment. The wheel construction can thus be greatly simplified and unnecessary refinements in the equipment omitted. Continuity of service and minimum maintenance expense must be kept in mind, however, as they are essential factors.

In locations where the original water supply is not ample or where peak loads require a greater volume of water for a few hours than is provided by normal flow, water storage and water saving during the periods of low load demand are necessary. Careful consideration to the hydraulic and load conditions must then be given and the equipment provided with the necessary devices for economizing on water.

Another set of conditions under which successful power plants are sometimes installed is that where the flow of water varies throughout the seasons or from day to day, and where dependence must be made primarily on the stream flow. Installations such as this require equipment developing uniform high efficiency and complete water economy.

The installation at the Preston School of Industry at Ione, California, is an installation of this nature. A limited and variable stream of water was available but local conditions precluded the use of a storage reservoir, except of a limited capacity.

A 6300-foot, 18-inch pipe line was installed, giving a head of 270 feet. The hydraulic unit which was best adapted to meet the conditions was a double runner, duplex nozzle impulse turbine of 180 hp. capacity, direct connected to a 100-kw. generator. Very close regulation being essential, a governor and flywheel were employed to bring about the desired results. Another interesting feature of the installation is the extremely shallow tail race. The tail race was constructed in this way to permit the utilization of every possible foot of head above the turbine, while still giving sufficient elevation to permit the tail water to flow into an irrigating ditch.

Importance of Pipe Line Selection

The selection of the pipe line and pipe is another important factor, though many times it is not given sufficient thought. The pipe line has the power to

A small mountain stream that, with storage, would supply water for an isolated plant.

make or mar the ultimate success of the isolated plant installation, even though every other link in the system is of the highest character. Its influence in speed regulation is of great importance and its economical design, to enable it to perform its functions properly, is needful of thorough study.

In regard to the influences of the pipe line on speed regulations it should be borne in mind that the very finest governor cannot achieve the impossible, and must be supported in its functioning by the capabilities of the pipe line. The law of gravity is the governing law of hydraulics and if the pipe line tends to unduly impede the flow, the governor cannot overcome the impediment.

Suppose a governor makes its full stroke in 2 seconds. The pipe line must be so laid out that it will insure an ample supply of water being delivered to the turbine at that rate of governor movement. If the pipe line will not permit the entire water column to accelerate at least as rapidly as the governor operates, a call by the governor for full water supply in response to a sudden load demand will not have the desired result, no matter how capable the governor itself may be.

A careful study of each individual case should always be made, using an authentic profile of the proposed pipe line. The proportioning of the pipe diameters is directly dependent on the shape of the profile, and should never be made without due regard to it.

Factors in Plant Design

A brief summary of the important points to be considered in the design of isolated hydroelectric plants may be made with the following diagram.

Storage

Influence on the turbine design.
Relation to seasonal variable flow.
The influence of load factor on size of reservoirs.

Pipe Line

Influence of the pipe line profile on speed regulation and water column acceleration.
Influence of operating conditions on pipe diameters.
Anchorage of pipe sections.
Type of pipe and joints.
Necessity for expansion joints.
Installation of air valves.

Type of Hydraulic Pime Mover—Impulse or Reaction

Head
Load factor.
Speed regulation.
Relative efficiencies.

The use of expansion joints is a question that often comes up in connection with isolated plant design. Generally speaking, expansion joints have been found to be expensive, though sometimes necessary. Unless the pipe line is frequently emptied and is greatly exposed to the sun when empty, expansion joints may not be necessary. The steady flow of water usual in power pipe lines maintains a sufficiently constant temperature generally to obviate the necessity of installing expansion joints.

The Record of 100 Dam Failures

BY LARS JORGENSEN

(The following records relating to failures of dams constitute a valuable compilation of data, the first instalment of which appeared in our issue of March 1st. The author, who is a prominent San Francisco engineer, has made a special study of this important subject.—The Editor.)

STRAIGHT GRAVITY DAMS

1799—Dam del Gasco, Guadarrama river. Two walls 9 ft. thick connected by cross walls. The compartments filled with clay and stone. During a flood water overtopped the dam, swelling the clay, and forced over part of the front wall. Wegmann.

1881—December—The Habra Dam, Algiers. Masonry dam, 110 ft. high, 1066 ft. long. Faulty construction and great flood. 209 lives lost. Wegmann.

1887—November 2nd—Reservoir dividing wall at Little Rock, Ark. Rubble masonry 36 ft. high, 12½ ft. thick at bottom, 7 ft. at top. Wall poorly constructed.

1893—March—Water Power Company Dam at Des Moines, Iowa. Concrete dam. Ice. Undermining and faulty construction. Engineering Record, April 15, 1893.

1895—October 10th—Scranton, Pa. Rubble masonry dressed with granite faces filled with concrete and strengthened with stone buttresses about 24 ft. apart. Wall 10 ft. thick at base; depth of water 20 ft. 120 ft. gave way after having been in use for 10 years.

1895—April 10th—Los Angeles Dam, Calaveras County, California. 400 ft. long, 52 ft. high, 35 ft. thick at base, top 3 ft. Rubble masonry. Undermined.

1895—April 27th—Bouzey Dam near Epinal, France. Masonry dam 1700 ft. long, 49 ft. above river bed. Failure due to great tension at the upstream face. Great loss of life and property. Wegmann.

1899—April 30th—St. Anthony's Falls Water Power Company, Minneapolis. Coursed ashlar sandstone masonry. 530 ft. long, 18 ft. high, 12 ft. thick at base, 5 ft. at top. Ice pressure. Engineering Record, May 13, 1899.

1900—April 7th—Austin, Texas. 1275 ft. long, 68 ft. high, 66 ft. thick at the base. Masonry dam. A freshet and great depth of water flowing over the crest forced 500 ft. of the dam down the river. Damage $500,000. Cost of dam $1,400,000. Engineering Record April 14, 21, May 19, June 30, July 28, 1900.

1901—December 29th—Anderson, S. C., and Columbus, Ga. and Montgomery, Alabama. Masonry dams. Freshet Dec. 29, 1901; also green concrete. Engineering Record, Jan. 11, 1902, also April 2, 1904.

1902—March 12th—Manchester, Conn. 175 ft. long, 30 ft. high. Masonry dam. About 50 ft. was moved along bodily by force of water before overturning. Muskrats burrowing under foundation. Engineering Record, June 21, 1902.

1904—November 2nd—Winston, N. C. Small distributing reservoir, 34 ft. high, brick dam. Wall overturned, being too weak. Poor design. Engineering News, Nov. 17, 1904.

Over 100 lives were lost by the failure of the dam at Austin, Pa., and a large amount of property irretrievably destroyed

1911—September 30th—Austin, Pa. Solid masonry. Built on poor foundation. Slid downstream and broke. Over 100 lives lost.

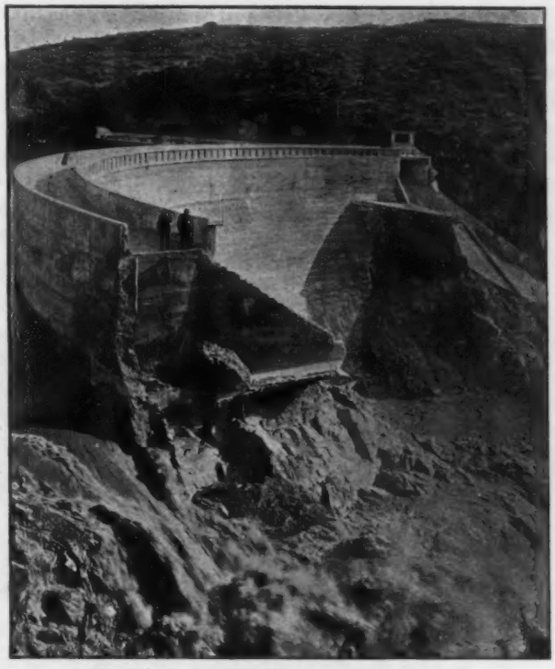
1912—April 1st—Oswego, N. Y. Low masonry structure resting on a crib sunk in gravel was undermined. Engineering Record, April 13, 1912.

1912—April 5th—Owasco Lake dam. Masonry structure, rectangular gravity section 10 ft. high, undermined after prolonged period of leakage. Engineering Record, April 27, 1912.

1912—April 8th—Rockport, N. Y. A masonry dam, weakened by pressure of a heavy ice jam during the previous winter was overthrown by a spring freshet. Engineering Record, June 22, 1912.

1912—May 20th—Lincoln Pond dam, Essex County, N. Y. 25 ft. high. Poor engineering and construction. Dam built of cobble, stone cement and gravel. Slid on smooth rock foundation. Considerable damage. Engineering News, June 6, 1912.

1912—July 15th—The Bow River dam near Namaka, Alberta. A concrete dam, failed July 15th due to undermining of the gravel foundation. Water penetrated a fracture in the inner apron caused by ice thrust during previous winters. Engineering Record, Oct. 5, 1912.



Sweetwater dam, an example in which there was no failure of the dam, but the abutments of blocky and decomposed porphyry gave way during the floods of 1916. An example of the difficulty of getting abutments at the sides of a canyon sufficiently firm to resist arch action. This structure is too thick to act as an arch, and has a gravity section.

1912—November 30th—Nashville, Tenn. 34 ft. high. masonry wall slid out together with a section of the limestone foundation. Engineering Record, Nov. 16, 1912.

1912—October 30th—Port Angeles, Wash. Concrete dam. A blowout 40 ft. wide and 60 ft. or more deep, through the porous gravel underlying the dam. Engineering Record, Nov. 30, 1912.

CURVED GRAVITY DAMS

1802—April 30th—The Puentes Dam, Guadalantin river, Spain. 925 ft. long, 164 ft. high. Masonry dam, polygonal in plan, being convex upstream. Failed by undermining, not crushing. Was built on piles in gravel bed. 608 lives lost. Damage, $1,045,000. Wegmann.

1836—The Elche Dam, Rio Vinolapo, Spain. Curved masonry, 76 ft. high, 230 ft. long on crest. Upstream radius 205 ft. Broke a piece off due to great flood passing over it. Wegmann.

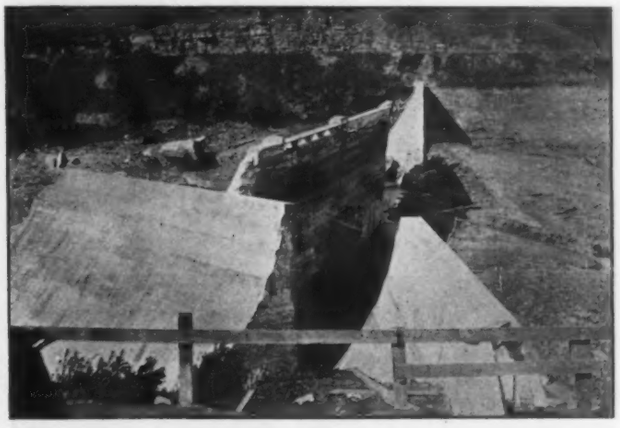
1891—January—Housatonic Dam, near Birmingham, Conn. Curved masonry dam, 636 ft. long, 40 ft. high, 25 ft. thick at the base and 8 ft. at coping; cost $264,000. In 1869 while under construction, heavy freshet carried away 160 ft. of the partly finished work and scoured out a cavity 20 ft. deep in the river bed. This cavity was filled with loose rock and a timber apron filled with concrete was placed upon it. Twenty-two years afterward 250 ft. of the dam was swept away by undermining the loose rock under the timber apron.

ROCK FILL DAMS

1890—February 22nd—Walnut Grove Dam near Prescott, Arizona. 400 ft. long, 110 ft. high, 140 ft. at base, 10 ft. at top. Rockfill with timber lining on waterside. Water flowing over crest of dam. 150 lives lost; damage, $800,000.

1893—August 6th—Pecos River, 6 miles above Eddy, N. M., 1,040 ft. long, 45 ft. high, 21½ ft. wide at water level and 6½ ft. on top. Upstream slope 1½ : 1 of rock faced with earth, sloping 2 : 1, and the down stream slope 1 : 1. Engineering Record, August 26, 1893.

1916—January—Lower Otay dam near San Diego, Cal. Top width 16 ft.; side slopes 1½:1 with steel diaphragm located on the line of the top above the water slope, allowing free access of water pressure to that plane, leaving the rockfill below the diaphragm the sole dependence for stability. Failed by water overtopping the structure. Engineering News, Feb. 3 and 17, 1916.



Failure of a solid masonry dam at Austin, Pa., on September 30, 1911. The dam was built on a poor foundation and slid downstream and broke.

STEEL DAMS

1908—April 14th—Hauser Lake, Missouri river. Steel structure. 630 ft. long, 70 ft. high. Upstream toe a rubble masonry fill with steel sheet piling to hard river ground. Water passed under rubble masonry. Engineering News, April 30, 1908.

TIMBER DAMS

1892—December—Tacoma, Washington. Timber dam 120 ft. long, with 17 ft. of water. Dam was undermined. Built on yielding material. Engineering Record, January 7, 1893.

1890—August 27—Northfield, Vermont. 100 ft. long, 25 ft. high. Timber. No engineer was employed for the design and construction.

REINFORCED CONCRETE DAMS

1909—January 7th—Ambursen dam, Ashley dam, Pittsfield, Mass. 400 ft. long, 40 ft. in height. Water undermining the dam. Engineering News, April 1, 1909.

1909—December—Canaseraga Creek, near Dansville, N. Y. Reinforced concrete. High water. Engineering Record, January 1, 1910.

1912—January—Janesville, Wis. Reinforced concrete dam. The water, although having a head of only 9 ft., forced a passage through the underlying sediments, and undermined about 50 ft. of the dam without damaging the structure itself. Engineering Record, Jan. 13, 1912.

1914—January 15—Stoney river dam, reinforced concrete, Ambursen type. Five bays slid out due to undermining. 1065 ft. long, 51 ft. high. Engineering News, Jan. 22, 1914.

1916—May 15—Plattsburg dam, hollow reinforced concrete, at West Brook, N. Y. Water percolating under foundation and destroying same. Six bays or 90 ft. in length were torn out and washed down stream. Dam 94 ft. high and 330 ft. long. Engineering News, June 8, 1916.

Electric Power—"Farthest North"

BY ALLEN E. RANSOM

(So indispensable is electricity to the successful carrying out of large enterprises that heavy equipment is transported over miles of snow fields, mountain passes, rivers and ocean. The following interesting account of electric dredging in the gold fields of the far north gives some idea of the extent of these enterprises and the part played by electricity in their working out. —The Editor.)

After the first rush of gold seekers to the fields of "The Klondike," which have yielded up over 300 millions in gold, operators put over twenty-five million dollars into hydroelectric and steam turbine plants, with miles of ditches and powerful hydraulics to scrape the Klondike river from source to mouth for its hidden wealth.

The First Comers —

Among the first of these was the Yukon Gold Company, which installed, a few miles from Dawson, a hydroelectric plant of 1875-kw. operating under a 650-ft. head, and consisting of three 54-inch Pelton water wheels each direct connected to a 625-kw., 2200-volt, 3-phase, 60-cycle, 450 r.p.m. a.c. generator with 17-kw., 125-volt exciters, and controlled by a six panel switchboard with a voltage regulator, all of Westinghouse manufacture. The current was stepped up from generator voltage by nine transformers to 33,000 volts.

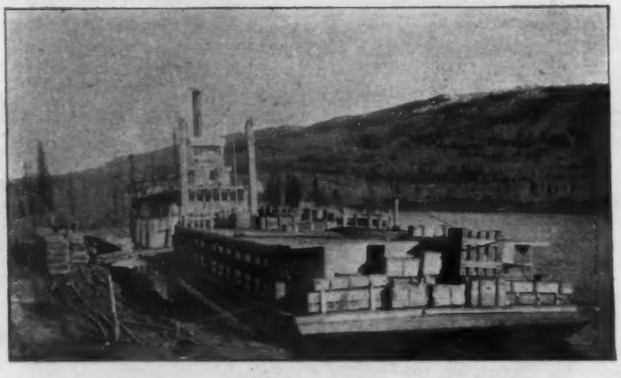
The Northwestern Light, Power & Coal Company's special railroad over which the 10,000-hp. plant from Coal Creek was shipped out to be transplanted to Japan.

With 36 miles of main line transmission and 18 miles of branches, this company supplied energy for nine electric dredges, each utilizing from 300 to 500 hp. and capable of handling from 5000 to 7000 yards of thawed gravel per day during the dredging season, which extends from May 15 to November 1 each year. With gravel running from $0.10 to $1.00 per yard and sometimes richer, and only four men required on a shift, the short operating season yields rich returns.

Following this development came that of the Canadian Klondike Company, which, having located a water power on the North Fork of the Klondike river, about 26 miles above Dawson and within 175 miles of the Arctic Circle, installed a 10,000-hp. hydroelectric plant. The electric equipment consisted of two 3000-kva., 2300-volt, 60-cycle, 3-phase, 514 r.p.m. a.c. generators direct-connected to 5000-hp., I. P. Morris-Francis reaction turbine wheels; one 85-kw. exciter direct-connected to a 36-inch water wheel and one 85-kw. motor generator exciter, together with six panel switchboard and two banks of step-up transformers from 2300 to 33,000 volts, each bank consisting of three 1250-kva. OIWC transformers.

Operating Electric Dredges —

At Bear Creek a step-down station of 3500 kw. was built to supply the various dredges in the district. Later, a 500-kw. steam turbine auxiliary was so connected through step-up transformers of equal capacity, that at least one dredge could be operated by steam power ahead of the others at the beginning and end of the season. This plant being located farther north than the Yukon Gold Plant, the company found it necessary to install electric heaters at the intake, and at intervals of about two miles in its six-mile power ditch, and also in the receiving chamber at the penstock heads to keep the anchor ice thawed out.



Floating equipment down the Yukon on barges. All types of locomotion were necessary to overcome the excessive transportation difficulties connected with electrical dredging installations in the Klondike.

This company operated four dredges, three of which were much larger than those used by the Yukon Gold Company, having a capacity of 10,000 to 12,000 yards per day.

At Bear Creek Station a physical connection was made with the system of the Yukon Gold Company and the two systems operated in parallel, but for a number of years this plant carried both systems.

A Transportation Record —

The 10,000-hp. plant of the Northwestern Light, Power and Coal Company was a Westinghouse steam turbine station, located at Coal Creek about 45 miles down the Yukon from Dawson.

The equipment for this station was shipped largely by the British Westinghouse Company, at a great expense from Manchester, England, across Mexico to the Pacific, and via the San Francisco water route to Skagway and St. Michaels and then by the White Pass Railroad, a thousand-mile trip

down the Yukon and partly over the 600-mile Snow Trail in winter. The plant was finally installed by a 60-mile, 33,000-volt transmission line with the Dawson systems. It was intended to supply dredges in addition to the existing equipments, but owing to legal difficulties and the lack of coal at the supposed mine at Coal Creek, after an investment of over $2,500,000, if only operated 100 days. It was not destined to rust and rot, however, for the whole plant, piece by piece to the last rail, was dismantled and shipped to Japan, where it now adds its output of kilowatt-hours to the growing paper mill industry in that country.

This group of electric stations with their 25,000 hp. of generating equipment and 10,000 hp. of auxiliary apparatus, located practically on the Arctic Circle and "farthest north" of any similar installations in the world, have operated for fifteen years and have added over $150,000,000 of gold to the wealth of the world, besides extending literally to the farthest corners of the earth the prestige of electric power.

The Multi-Stage Impulse Turbine

BY WILLIS T. BATCHELLER

(The study of the structure and theory of operation of the steam turbine is complicated by the great variety of types and makes which have been brought to perfection. The characteristics of the multi-stage impulse turbine are here described in the third of a series of articles by the electrical engineer of the Seattle Lighting Department.—The Editor.)

In the multi-stage impulse turbine, a number of wheels are arranged in successive chambers with a set of nozzles between each chamber for expanding the steam and increasing its velocity before it impinges on the blades of the succeeding wheel. In this way the total heat drop is divided into a number of steps, thereby reducing the heat drop in any one stage and correspondingly reducing the velocity of the steam jet and wheel periphery. The speed of the turbine is reduced to a value which allows it to be directly connected to the apparatus which it is to drive.

The Kerr turbine is an example of this type of turbine. The Curtis turbine is similar, with the single exception that the first stage has two rows of revolving blades with a stationary row between.

Nine-Stage Impulse Turbine

We will now take the case of an ideal nine-stage impulse turbine operating under the same steam conditions as before, with the exception of the exhaust pressure which for this case will be 0.732 lb. absolute corresponding to 28½ in. of mercury.

Neglecting friction, the velocity of the steam issuing from each nozzle is dependent upon the heat drop in the nozzle. In the case of the nine-stage turbine, the heat drop per stage will be one-ninth of the total heat drop.

The initial heat contained in one pound of steam is 1270.5 B.t.u. as before, and the final heat is now 890 B.t.u. after the steam is condensed.

The total heat drop is $1270.5 - 890 = 380.5$ B.t.u.

and the heat drop per stage $\frac{380.5}{9} = 42.3$ B.t.u.

The initial velocity of jet from each nozzle is

$$V = \sqrt{\frac{H_1 - H_2}{N}} = 1456 \text{ ft. per sec.}$$

With a peripheral velocity of 450 ft. per sec. and an angle of the nozzle with the plane of rotation of 20 degrees, the final velocity of the steam after leaving the first set of moving blades is 1055 feet per second. The kinetic energy absorbed in the first set of moving blades, per pound of steam is

$E_1 = 15{,}635$ foot-pounds per second.

In the second set of moving blades the energy is

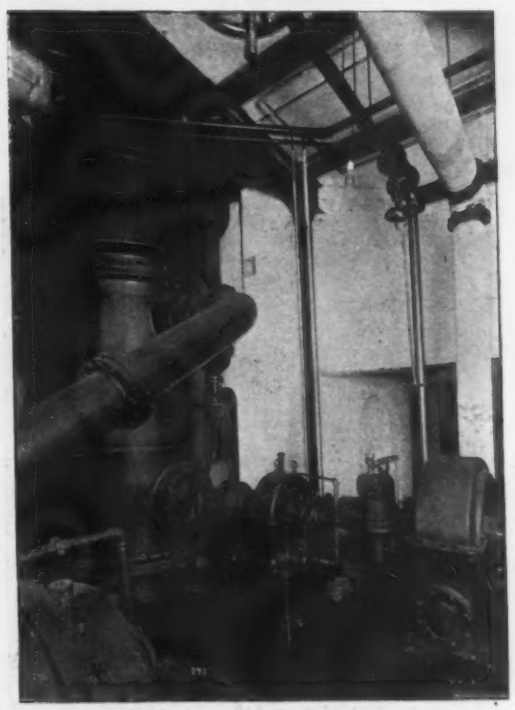
$E_2 = 13{,}400$ foot-pounds per second.

The total energy converted into useful work in the first stage, per pound of steam is

15,635 plus 13,400 = 29,035 foot-pounds per second.

If the entire heat drop had been utilized in doing work, leaving the steam with zero velocity, the total energy would be

$$\frac{(1456)^2}{64.4} = 32{,}920 \text{ foot-pounds per second.}$$



Allis-Chalmers 90-hp., 3600 r.p.m. impulse turbine at right driving 860 r.p.m., 20-inch double runner discharge pump for high vacuum jet condenser through Falk reduction gears. Condensing equipment operates in conjunction with a 4000-kw. steam turbine.

The difference between this figure and the 29,035 foot pounds per second, actually transformed into work, is 3,885 and it represents the loss due to the residual velocity of the steam leaving the second row

of buckets. Since the steam is brought to rest before entering the second set of nozzles, this energy is lost.

The heat equivalent of this energy is $\frac{3,885}{778} =$ 5.0 B.t.u., which increases the final heat content of the steam passing on to the second stage, as follows:

$$1270.5 - 42.3 + 5.0 = 1233.2 \text{ B.t.u.}$$

The remaining stages each have one set of moving blades and may be analyzed in a similar manner.

Neglecting the energy remaining in the exhaust steam, the total heat drop of 380.5 B.t.u. per pound is available for doing useful work. The water rate of the ideal turbine would be

$$\frac{2456}{380.5} = 6.7 \text{ pounds per horsepower hour.}$$

The heat consumption per horsepower per minute

$$= \frac{6.7\,(1270.5 - 890)}{60} = 42.2 \text{ B.t.u.}$$

The thermal efficiency

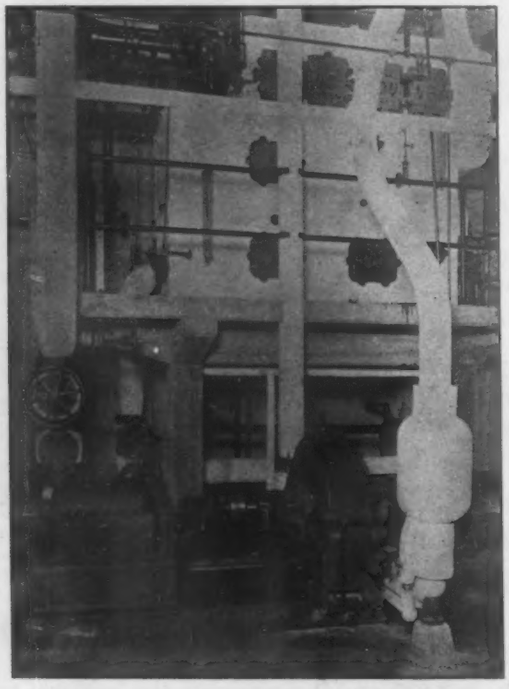
$$E_t = \frac{1270.5 - 890}{1270.5 - 59.7} = 0.314$$

Under the above conditions a Curtis turbine would actually have a water rate of about ten pounds per horsepower hour.

The thermal efficiency would be

$$E_t = \frac{2546}{10\,(1270.5 - 59.7)} = 0.21,$$

and the Rankine cycle ratio $= \frac{0.314}{0.21} = 0.669.$



100-hp. Terry impulse turbine at the Lake Union Steam Electric Station, City of Seattle, driving 400-gal. per. min. boiler feed pump.

THE PROVINCE OF SALESMANSHIP

BY C. B. MERRICK

(The business of educating the public to familiarity with electricity is largely a problem of salesmanship. The broader aspect of salesmanship in its relation to electrical development is the subject of the following discussion.—The Editor.)

The chief obstacle to the universal adoption of the method electrical is unfamiliarity. More than any other modern convenience electricity is a mystery to the public, and what the public does not understand it distrusts or neglects. Electrical development is only bounded by the ability of its promoters to convince the public, and in proportion as the public is educated, so will the use of electricity increase.

Whose Business Is It? —

The accomplishment of their education is the primary work of salesmanship. Salesmanship in its broadest sense means a good deal more than merely effecting the exchange of a certain article or commodity for a given sum of money. Salesmanship is the link between those who know and those who do not know; it is the art of getting the other man's viewpoint, realizing his needs, and supplying them in a way that is honestly beneficial to him. A sale which benefits only the seller is no sale in the long run.

The public judges the company, and even the company's products, largely by the salesmen, and each employe is personally responsibile for the public's estimate of his company.

Inside and Outside Salesmanship —

But the field of salesmanship does not end here. It embraces every department of every organization, and whether you are connected with the sales force or not, you come in contact with salesmanship every day and use it. There is a story of an Alabama darky (he must have been an Irishman in a previous life) who took part in a debate on the subject, "Which is of greater importance to the world—the sun or the moon?" Explaining how he won the debate, he said, "Ah jus' done sayd dat dah moon was mos' impo'tant 'cause the sun he shine in de daytime when we don' need no light, and de moon he shine at night when we sho' do need it; an' they wan't nobody could argy roun' it."

The interdependence between the different departments of an organization is based on the principles of salesmanship. The office boy sells his services to the firm and holds his position just so long as he fills the needs of the office. The general manager planning improvements and extensions sells these ideas to the president by proving their necessity and advantages. Together they sell the idea to the banker, and through him to the bond-buying public. In each transaction there is or should be mutual benefit involved; and each transaction is definitely based upon salesmanship.

Since salesmanship is so all-important a factor both within a business and without, it is necessary for every employe to regard himself as a salesman in the broadest sense of the word. Only in this way can the message of the electrical industry be adequately conveyed to the public.

Planetary Attraction and the Helium Atom

BY DR. A. C. CREHORE

(The substances composing the sun, the planets and other heavenly bodies are seemingly made up of mixed kinds of solid matter that offer interesting comparisons under the analysis of Dr. Crehore's new theory of mass and attraction. A star composed of helium is herein discussed and conclusions drawn. This is the ninth paper appearing in the columns of the Journal of Electricity by this noted author on the subject of The New Physics.—The Editor.)

In the preceding example, by which the average speed of an electron in the earth was found, the mass of the earth in grams was used as a factor both in getting the total $\Sigma_E\beta^2$ and in getting the total number of electrons in the earth. Upon division to obtain an average the mass cancelled out. In other words it was really not required at all, and no error introduced through an incorrect numerical value of the mass of the earth could affect the final result in any way. From this it is apparent that the result above obtained for the earth is very general, and applies to the planets and sun or any other form of matter just as well.

Mass and Attraction

Let us consider two representative cases. First, apply the gravitational equation to find the attraction between a star, or large mass of nebulous gas composed entirely of hydrogen and nothing else, and a single hydrogen atom situated outside of the star at some distance, r, from its center of gravity. Denoting the mass of the star by M, Newton's law gives the average attraction as

$$F = k'\, m_H\, M\, r^{-2}.$$

According to the general expression for mass in terms of the sums of the squares of the speeds of all the electrons within the mass above deduced, we have for the star

$$M = \frac{e^2 m_e}{h}\,\Sigma_M\beta^2$$

and for the hydrogen atom

$$m_H = \frac{e^2 m_e}{h}\,\Sigma_H\beta^2$$

whence by division

$$M/m_H = \Sigma_M\beta^2/\Sigma_H\beta^2.$$

But, for the hydrogen atom having two electrons, the sum of beta square is twice beta square for a single electron, which may be denoted by β_H. Hence,

$$M/m_H = \Sigma_M\beta^2/2\beta^2_H.$$

And, solving for $\beta_H{}^2$, the preceding proportion is the same as

$$\beta^2_H = \frac{\Sigma_M\beta^2}{\frac{2}{m_H}\,M}.$$

In this form, since the star is by hypothesis composed entirely of hydrogen, the actual speed of an electron and the average speed are the same thing, all speeds being alike. Hence the equation really says that the average square of the speed is equal to the sum of the squares of the speeds of all the electrons in the star divided by $2M/m_H$. The average square of the speed must, however, be equal to the total sum of the squares of all the speeds divided by the number of electrons in the star. It follows that the denominator of the last expression must be the total number of electrons in the star. This is evident directly, for the mass of one gram divided by the mass of the hydrogen atom must equal the number of atoms in a gram, namely $1/m_H$. Since there are two electrons per atom in hydrogen, the number of electrons per gram is twice the number of atoms, namely $2m/_H$. Since M denotes the number of grams in the star, evidently $2M/m_H$ must be the total number of electrons in the hydrogen star.

Now the number $1/m_H = 1/1.658 \times 10^{-24}$ is very nearly equal to the well-known Avogadro constant. Hence the number of electrons per gram of hydrogen according to the result is about twice the Avogadro constant.

The next representative case to be considered is that of a helium star attracting, say, a single helium atom at a great distance, r, from the star. We have a similar proportion to the above, namely

$$M/m_{He} = \Sigma_M\beta^2/\Sigma_{He}\beta^2,$$

where the symbol (H_e) refers to the helium atom. According to the atomic weight table above given, the helium atom consists of a single ring of four electrons. Denoting the speed of one electron by β_{He}, the sum of the squares for one atom is

$$\Sigma_{He}\beta^2 = 4\,\beta^2_{He},$$

and the above proportion may be written

$$\beta^2_{He} = \frac{\Sigma_M\beta^2}{\frac{4}{m_{He}}\,M}.$$

In a similar manner to the case of the hydrogen star, the mean square velocity for the star must be the same as the square of the velocity of a single electron in the helium atom, β_{He}. Since the numerator represents the total sum of the squares of the speeds, it follows that the denominator must represent the total number of electrons in the star. And, evidently, $1/m_{He}$ is the number of helium atoms in one gram, and $4/m_{He}$ is the number of electrons in a gram of helium, and $4M/m_{He}$ must be the total number of electrons in M grams of helium, that is in the star.

Now, the mass of the helium atom compared with that of hydrogen is as the numbers 4.00 to 1.008. Hence, $4/m_{He} = 1.008/m_H$. Using the Millikan value of $m_H = 1.662 \times 10^{-24}$, we obtain

$$4/m_{He} = 6.065 \times 10^{23} = \text{No. electrons per gram of He.}$$

This number is very close to the well-known Avogadro constant, which is given by Millikan as 6.062×10^{23}. In deriving his value Millikan used a value of the atomic weight of hydrogen 1.0077,

which he supposes is more accurate than 1.008. This will account for the difference in the last decimal place of the Avogadro constant.

These two examples have been chosen because the helium star, being based upon an atom with a ring of four electrons, is typical of all the other kinds of atoms, that is, of any mixed mass of matter, while the hydrogen star forms an exception to the rule, as it does in other particulars.

Planetary Attraction and the Helium Atom

Let us next consider an example of a planet, made up of any mixed kinds of solid matter, say, and compare the attraction of the planet for a distant helium atom with that of the helium star just considered for the same helium atom at the same distance. Let us also suppose that the masses of the planet and of the helium star are the same, each equal to M. Denote by A the Avogadro constant. As above, we have for the helium star

$$\beta^2_{He} = \frac{\Sigma_M \beta^2}{A\,M},$$

And, for the planet we have

$$\overline{\beta^2} = \frac{\Sigma_M \beta^2}{x\,M}.$$

Here $\overline{\beta}^2$ is the average mean square of the speeds of all the electrons in the planet, and we have used x for the number of electrons per gram. Since we know that the masses of any two bodies are strictly proportional to the sums of the squares of the speeds of the electrons they contain, and since we have taken the mass of the helium star equal to that of the planet, it follows that the numerators above are equal. When we divide the one expression by the other, these sums of squares of the velocities cancel out as well as the masses, and we have the simple relation

$$\frac{\beta^2_{He}}{\overline{\beta^2}} = \frac{x}{A} \text{ or } \overline{\beta^2} = \frac{A}{x}\beta^2_{He}.$$

Now, it is well known that the number of electrons per gram, x, of any substance except hydrogen is approximately constant. This may easily be proved on either of the two suppositions that the number of electrons per atom are nearly proportional to the atomic number or to the atomic weight, it does not matter which, since the atomic weight is roughly twice the atomic number. Hence x is a constant number for any kind of mixed piece of matter like the planet we are considering. Moreover, it is believed that this number is very nearly equal to the Avogadro constant. If we make it equal to this constant, then the x and A cancel out above, leaving

$$\overline{\beta}^2 = \beta^2_{He} \text{ or } \overline{\beta} = \beta_{He}.$$

That is to say, the average speed of an electron in the planet is very nearly the same as the speed of an electron in the helium atom, and this is the same as the speed in a ring of four electrons.

Atomic Weight Scheme

This is, therefore, the reason why the average speed in the earth in the previous example came out the same as the speed in a ring of four electrons very nearly. The result is, therefore, general as applying to any planet, and the fact that it is so is intimately connected with the scheme given in the atomic weight table above, which makes the number of rings of four electrons greatly in excess of any other kind of ring. This arrangement may also be regarded as the reason why the number of electrons per gram is very nearly constant for all substances except hydrogen. These considerations seem to establish in a fairly satisfactory manner the scheme of the atomic weight table in this one particular at least, namely, indicating that rings of four electrons greatly preponderate in the atoms of different elements.

An artificial reservoir in the mountains of Montana, the property of the Mission Range Power Company of that state. The power house installation consists of two 350-hp. tangential water wheels connected to two 200-kva. generators. Electricity is transmitted to Polson where it is distributed to consumers in the town. Midway between the power house and Polson the line is tapped by the Flathead Valley Electric Company which purchases power wholesale from the Mission Range Power Company and retails it for lighting and power in the towns of Ronan and Pablo.

SPARKS—Current Facts, Figures and Fancy

(On this page a description of the most remarkably beautiful telephone in the world stands alongside of an announcement of the latest discovery in steel manufacture. Fascinating subjects such as an underground bakery, cities-made-to-order, the latest and most adventurous field for American engineers, an electrically operated device for the prevention of train wrecks, and the discovery of remarkable coal fields in Utah are also presented.—The Editor.)

The scarcity of coal is not proving of as great moment as one might have thought a year or two ago. A decided tendency is noticeable in Great Britain to substitute oil fuel for coal wherever possible. Shipping companies, and even railroads, are making or planning extensive conversions of equipment, so that this kind of fuel can be used.

* * *

A scientist of Norway has discovered a way of using the great quantities of white, marble-like rock abundant in the southwest part of that country. Thus by the use of nitric acid and the process of evaporation aluminum is obtained. The process may materially increase the supply of this metal, and most surely seems full of promise for that country.

* * *

Cities made-to-order are taking their logical place in our "ready-to-wear" civilization. City planners, architects and sociologists were allowed, during times of war time production emergency, to let their imaginations run riot, resulting in thirty-five custom-made Utopias, valued in the neighborhood of $55,000,000, which are soon to be placed on the market.

* * *

To find coal in solid formation on the very surface of the earth is indeed an encouraging discovery. This very condition is reported true in the southern part of Utah. It is estimated that there is probably over a billion tons of workable cannel coal in this region. The only thing preventing immediate profitable development, according to a prominent geologist, is the lack of transportation facilities.

* * *

The most remarkable telephone in the world is said to be that possessed by the Queen of Spain. This luxury of luxuries is of solid silver with a gold transmitter, and is supported by four bronze figures, among which a boy leaning against a Spanish coat-of-arms is conversing by telephone—a golden wire—with an English girl in close proximity to a British lion. This work of art stands on her majesty's writing table, and connects with the royal nursery only.

* * *

The newest and most adventurous field for American engineers is said to be the far-off land of Rumania. All reports indicate that there are tremendous fields for engineering achievement and financial profit there. Bridges must be built, harbors extended and canals cut. An idea of old Rumania's potential hydraulic power can be gained from the fact that an average of 32,268,521,000 cubic meters of water flow into the Danube yearly, or 1,023.23 cubic meters per second. An employment of thirty-five per cent of this volume of water would furnish 500,000 horsepower in average years.

* * *

Tungsten may have to take a back seat as the world's hardest steel. Announcement comes from London that Molybdenum, the newest invention in steel, is far in advance of any high-speed steel hitherto made. Its discoverer claims that the new steel has far more commercial possibilities than any now in use, that it is unrivaled in hardness, that in tool form it will remove a greater weight than any other steel, and that it possesses comparatively longer life than any other.

* * *

It is rumored that within this year wireless telephones will replace the present system with great economic advantage. With China, the most backward nation, daily using the wireless telephone for communication between cities and the rural districts, we certainly can look for rapid advances in this country. This type of communication has a particular advantage in that it involves no line upkeep and in that service is not subject to interruptions due to atmospheric causes.

* * *

We may hope for the last of train wrecks when a certain late invention in railway engineering is established. This is an automatic, electrically-operated device, fashioned somewhat after the working of the automatic electric block signal system. Any obstruction on the track or any condition of the rails that breaks the circuit automatically shuts off the steam and applies the air brakes in the locomotive in time to bring the train to a complete stop a considerable distance from the danger point.

* * *

An underground bakery furnishes all the bread used by the refugee population in the ruined city of Verdun. No other building was sufficiently undamaged to house a bread-baking establishment for the returning townspeople, so the great "subway" ovens are daily turning out long, crisp loaves which compose the principal food of those toiling among the ruins. Several times each day the bread is brought to the mouth of the black cavern beneath the great walls, where lines of people await their rations. The bakeshop is a part of the famous underground city of Verdun, built after the war of 1871 and designed to house 30,000 persons during an attack. During the Great War, thousands of soldiers and a few refugees lived in this subterranean abode while the city was under fire for nearly five years. The bakery was in operation during the whole time.

PERSONALS

W. B. Greeley, assistant forester, has been appointed head of the Forest Service of the United States, to become effective May 1st, 1920. Mr. Greeley has long been considered an eminent man in forestry matters. Born in California, he received his early education here, graduating from the University of California with the class of 1901. Since that time he trained at the Yale Forestry School, and has served in various forestry districts throughout the West, having charge for a number of years of Forest District No. 1 with headquarters in Missoula, Montana, the largest district of the six districts in America. The West views with unusual interest the appointment of Mr. Greeley to his new position. It is believed that his intimate knowledge of affairs electrical in the West, and the vast possibilities of hydroelectric development now existent in the nation, will make possible new and helpful policies in the Forestry Service looking toward the development of our country.

M. Uchisaka, illuminating engineer for the Tokyo Electric Co., Ltd., of Tokyo, Japan, is a recent San Francisco visitor.

Mortimer Fleishhacker, president of the Great Western Power Company, is spending some time in the East on a business trip.

G. F. Kirkpatrick, Pacific States Electric Company salesman, Seattle, was called East recently by the death of his mother.

D. W. Pontius, manager of the Pacific Electric Railway Company of San Diego, was in San Francisco lately on a business trip.

C. G. A. Baker, vice-president and general manager of Baker-Joslyn Company, San Francisco, spent two weeks recently in Seattle.

H. H. Manny, manager Seattle office of Baker-Joslyn Company, pole, line and construction material, is spending some time in San Francisco.

M. C. Osborn, formerly head of the commercial department of the Washington Water Power Company, is now range specialist for Landers, Frary & Clark, with headquarters in New Britain, Conn.

C. R. Manville, vice-president of the H. W. Johns-Manville Company, Milwaukee, is making a tour of the Pacific Coast and was in San Francisco for several days.

Frank J. Wachter, vice-president, and **William C. Sears**, sales manager of the motor appliance department of Landers, Frary & Clark, are making a tour of Western cities.

R. R. Barlett, chief engineer of the Port of Astoria, left recently on a four or five weeks' trip to Chicago, New York, Boston, Philadelphia and Baltimore to investigate the various types of cargo handling equipment and also to confer with officials of the shipping board.

Edwin A. Rogers has resigned his position as chief engineer in charge of the Cornelia Copper Company's power plant at Ajo, Arizona, and will come to San Francisco in April to engage in consulting engineering, specializing in fuel oil combustion and power plant efficiency work.

W. D. Ward is announced as the manager of the Atlantic Department of the Pelton Water Wheel Company. Mr. Ward has been associated with the Pelton Water Wheel Company for more than twenty-five years, having been the ranking sales engineer in the home office previous to his assumption of the post in New York.

J. J. Crowe, formerly sales manager of the Intermountain Electric Company, has tendered his resignation to become general manager of the Utah Electric & Motor Equipment Company of Salt Lake City. The latter company is a reorganization of the firm of Eardley Brothers, and conducts a retail electric and automobile accessories and service business.

Ake Alin, assistant engineer of the Royal Swedish Board of Waterfalls and the representative of the Swedish government to examine large dams and the utilization of water power in the United States, is a recent San Francisco visitor. Mr. Alin is particularly interested in the large hydroelectric projects in the West and will probably visit the Hetch-Hetchy before his return, as the Swedish government is contemplating extensive construction of large dams for the development of power in the extreme northern part of Sweden.

C. C. Campbell, for some time past local manager of the Mountain States Telephone & Telegraph Company at Salt Lake City, has severed his connection with that company to become sales manager of the Intermountain Electric Company, a prominent jobbing house of both electrical supplies and auto accessories, with headquarters in the same city. Mr. Campbell served with the telephone company for sixteen years in various capacities. He will be succeeded as manager of the telephone company by F. W. Carroll, formerly their manager at Ogden, Utah.

William S. Turner, consulting civil and electrical engineer of Portland, Oregon, recently returned from a trip of several weeks' duration in the East. New York and other eastern cities were visited. The trip was taken in connection with valuation reports for eastern financiers interested in various properties on the Pacific Coast. Mr. Turner is also endeavoring to obtain the assistance of New York capital in developing a large hydroelectric project in which he and others are interested. He discussed with various financial people the general situation regarding development of water power on the Pacific Coast. Some study was also made of the electric railway situation in different cities as regards rates, franchise matters and competition of motor bus lines.

George L. Myers, who has recently been appointed assistant to the president of the Portland Gas & Coke, Pacific Power & Light, and Walla Walla Valley Railway companies, is among the most active workers in electrical affairs of the Northwest. He came to Oregon in 1907, and previous to his association with the companies mentioned above, was in the employ of the Oregon-Washington Railroad & Navigation Company. In 1912 he became assistant treasurer of the Pacific Power & Light Company and private secretary to the president of the three associated companies. He has been active for some time in the affairs of the Northwest Electric Light & Power Association, and at the annual convention in Seattle last September was elected vice-president and member of the executive committee. He is also a member of the public policy committee of the association and chairman of the public policy committee for Oregon. His new position involves important executive duties, for which his successful and energetic association work stamp him as exceptionally well qualified.

C. E. Magnusson, professor of electrical engineering and acting dean of the College of Engineering at the University of Washington, has been nominated as a vice-president of the American Institute of Electrical Engineers. Professor Magnusson has long been an active factor in affairs electrical in the West. After getting his doctor's degree from the University of Wisconsin, he trained under Dr. Steinmetz of the General Electric Company in Schenectady. Coming West, he was for a period in the physics department of the University of New Mexico, and since 1904 has been head of the electrical engineering department of the University of Washington, where he has become a leader in electrical thought in the Northwest. Robert Sibley, editor of the Journal of Electricity, who was also proposed as a candidate for the A. I. E. E. office, resigned in favor of Professor Magnusson.

L. R. Cady, general manager of the Lassen Electric Company, was among recent visitors to San Francisco.

H. H. Jones, general manager of the San Diego Consolidated Light and Power Company, is a recent San Francisco visitor.

Harry Noack, of the Pacific States Electric Company, San Francisco, passed through Seattle recently on his way home after a trip through the East.

J. J. Estabrook, who for the past three years has been Western manager of the Standard Electric Time Company, with headquarters in Chicago, is now located in San Francisco.

Bruce Lloyd, manager of the engineering department with Henry Lund & Company, San Francisco, left on March 26th for a visit to New Zealand. He will be away three or four months.

Franklin T. Griffith, president of the Portland Railway Light & Power Company, **Guy Talbot**, president of the Pacific Power & Light Company, and **D. L. Huntington**, president of the Washington Water Power Company, are recent San Francisco visitors.

A. A. Brown, assistant to the vice-president, and **Frederick Darlington**, consulting engineer of the Westinghouse Electric & Manufacturing Company, were in San Francisco for a brief visit lately. They are making a tour of inspection over the Western plants of the company.

Magnus T. Crawford, electrical engineer for the Puget Sound Traction Light & Power Company, passed through San Francisco recently on his way back to Seattle. Mr. Crawford has been making an extended trip throughout the United States looking into underground distribution systems.

Reinier Beeuwkes, chief electrical engineer of the Chicago, Milwaukee and St. Paul Railroad with headquarters at Seattle, has completed a wonderful piece of engineering in the electrification of the lines of the Chicago, Milwaukee and St. Paul, running east of Seattle. With the exception of one small gap the line is now completely electrically operated from Harlowton, east of the Rockies, to Seattle (Renton), west of the Cascades. Mr. Beeuwkes gained his knowledge of railway electrification in the work on the Cascade tunnel of the Great Northern Railway and as assistant to Mr. C. T. Hutchinson, who was consulting engineer for the Great Northern. Mr. Beeuwkes has been engaged in the electrification of the Chicago, Milwaukee and St. Paul ever since the start of the project and a great deal of the credit for the success of the achievement should go to him as he has overcome the numerous difficulties attendant upon such big undertakings in a way which has greatly advanced that branch of the industry.

J. T. Smoot, former petroleum chemist, U. S. Bureau of Mines, is spending a few days in San Francisco. Mr. Smoot is visiting California for the purpose of making a study of the state's oil conditions.

Lieut.-Colonel Wm. Kelly has recently come west to take charge of the Third San Francisco engineering district, succeeding L. H. Rand. Lieut.-Col. Kelly served for two years in France during the war, and later with the Peace Commission. His new offices will be at 240 Montgomery street, San Francisco.

J. C. Hoyt, chief of the division of Water Resources of the U. S. Geological Survey, was in San Francisco recently en route to Honolulu where he is going on official business. During his visit Mr. Hoyt was entertained by a group of San Francisco civil engineers at an informal luncheon at the Engineers' Club.

L. F. Harza, chief engineer for James O. Heyworth, has entered private practice as a consulting hydroelectric engineer with headquarters in Chicago. Mr. Harza, it will be recalled, was the author of an extensive survey of the Columbia river power developments which appeared in the columns of the Journal of Electricity in 1915.

A. Emory Wishon, assistant general manager of the San Joaquin Light & Power Corporation and president Pacific Coast Section N. E. L. A., has left for New York City. A number of prominent meetings have been arranged by James H. McGraw, president of the McGraw-Hill Company, for the delivery of Mr. Wishon's Self-Interest Story, which has proven in recent months to be one of the most helpful activities of the current year and has received national recognition from all sides. Mr. Wishon expects to return to California May 1st. His address will be given before prominent publishers, advertising men and financiers of the East.

Henry H. Buell, who has been electrical engineer with the Pacific Gas & Electric Company in the San Jose district for the past eight years, has accepted a position with the Bureau of Standards at Washington, D. C. Mr. Buell is a graduate of Stanford University, and previous to his connection with the Pacific Gas & Electric Company was associated with the East Pittsburgh factory of the Westinghouse Company, later serving as a hydraulic engineer for the Panama Canal Commission. His new appointment comes to him as a result of his marked technical ability, and his capable work in previous positions. He carries with him the best wishes of his Western friends and associates.

OBITUARY

Richard Ruddell, president of the Globe Stove and Range Company of Kokomo, Indiana, passed away recently.

Melvin B. Newcomb, aged thirty-one years, chief engineer of the rubber machinery department of the Wellman-Seaver-Morgan Company, died on Sunday, March 13th, after a short illness at his home, 742 West Avenue, Akron, Ohio.

John A. Randolph, of the Westinghouse Electric & Manufacturing Company, died a short time ago in Wilkinsburg, Pennsylvania. Mr. Randolph graduated from Syracuse University, Syracuse, N. Y., with the class of 1903. After graduating, he engaged in engineering and writing technical literature for trade magazines, to which work his education and experience permitted him to do full justice. Mr. Randolph was also engaged for a time in the activities of the Society for Electrical Development, located in New York.

Meeting Notices for Electrical Men

(A significant meeting of the Engineers' Hoover Republican Club; the Stockton meeting of the California Electrical Contractor-Dealers' Association, and a number of important engineers and contractor-dealer meetings held in the Northwest are reported in the following pages. The account given of the recent meeting of the San Francisco Electrical Development League is of especial interest.—The Editor.)

California Association of Electrical Contractors and Dealers

At the monthly meeting of the California Electrical Contractor-Dealers' Association held at Stockton, March 12, 118 were present of whom only 50 were actually contractor-dealers, showing that the other branches of the industry are beginning to realize the necessity of keeping posted on what is being done in all branches of the industry. The morning was taken up with the executive session and in the afternoon two important discussions were held. A code of ethics or practice was drawn up, discussed, and adopted unanimously, and there was lively discussion on the advisability of forming three divisions, or sections of the association, the three fields to be, motors, contractors, and dealers.

Twenty-five new members were admitted to the association and a new section was added, that of Kern county. The State Fair Commissioners suggested that there be an electrical exhibit at the next State Fair and have offered to put up a special building as an inducement to such an exhibit. No action was taken on this matter, but President Chamblin has appointed a committee to look into it.

In the evening Mr. Robert Sibley, editor of the Journal of Electricity, gave a real live talk on "The Status of the Electrical Industry in the West and Its Future Possibilities." Mr. A. Emory Wishon, president of the Pacific Coast Section, N. E. L. A., followed Mr. Sibley and pointed out that the spirit of the pioneers who braved the trackless waste of the desert and the difficulties and dangers of crossing the Rockies, still lives in the people of the West. For the vision of the West, its industry and invention, its resources and its climate, are all bringing another kind of a caravan from the East than that in which our forebears came. Mr. Wishon further pointed out that the West cannot develop ahead of its hydroelectric resources, all branches of industry depending on cheap electric power; that the development of our resources will take finances and that at the N. E. L. A. Convention at Psadena, in May, the bond men, bankers, power managers, manufacturers, jobbers and dealers from the East will be here, and it is up to the West to give them "A Western welcome and a chance to see what Western vision, determination and faith can accomplish, and what we have before us for accomplishment in the future."

Northwestern Contractors and Dealers Meet

The regular meeting of the First District, Oregon Association of Electrical Contractors and Dealers, was held a short time ago at the Chamber of Commerce, Portland, Ore. The following firms were represented:

J. F. Barrett, F. A. Bauman Electric Co., Jaggar-Sroufe Co., E. L. Knight Co., NePage-McKenny Co., L. M. Oliver, Pierce-Tomlinson Electric Co., Portland Electrical Maintenance Co., R. R. Poppleton, Scott Electric Co., Vanderlip & Lord, Western Electric Works.

Mr. Kenny, chairman of the Special Contractors' Policy Committee, reported that his committee did not find a lack of the spirit of cooperation, but found an indifference to the matter of reasonable profit, methods of determining costs and the true condition of the business in a great many cases. His report urged the individual member to give more attention to the matter of costs and recommended the adoption of a standard system of cost accounting by all the members, calling attention to the fact that his committee will be powerless to make any further progress until such time as all the members place their business on a firm basis.

Mr. J. F. Barrett gave a very interesting and instructive talk on his observations of conditions in the industry in San Francisco, gathered during his recent visit to that city, and forcibly brought to the attention of those present the great need of closer harmony and cooperation and the results to be looked for from the same.

Mr. Tomlinson also addressed the meeting, on the Northwest Cooperative Campaign. He explained how the movement was started, what its mission is, and read the report of its first Advisory Committee meeting.

The secretary urged that the "Suggestions by Members," an order of business which is usually overlooked, be more freely used, calling attention to the fact that members are too prone to be backward in submitting ideas occurring to them for the betterment of conditions, which if brought out and discussed, might develop in importance. He also urged all members to give more attention to the different trade journals and suggested that those who could not find time through the day to read them have them sent to their homes. He went on to emphasize that many of the important ideas found in them could be put into effect with great profit.

Meeting of Engineers' Hoover Republican Club

At a meeting of the Hoover Republican Club of San Francisco Engineers it was decided that a letter and enrollment card should be sent to all engineers on the mailing lists of the various local branches of the engineering societies. The letter states the reasons why Hoover should be the next President, and instructs all of the engineers interested to register as Republicans and to register before April 3rd. The enrollment card is a pledge to work for the election of delegates to the Republican Convention, who will cast their votes for Hoover as Republican candidate for President of the United States.

BUILDERS OF THE WEST — LXXIV

REINIER BEEUWKES

Since the time when the "Rocket" pulled its first load of freight and passengers, no greater advances have been accomplished in railroad engineering than the conquest of the Rocky and Cascade mountains by electric locomotives, culminating in the triumph of March 5, 1920. Long after the coal and oil supply of the country is exhausted, the hydroelectric plants will be furnishing the power necessary for the transportation of supplies to and from the East. To Reinier Beeuwkes, electrical engineer of Seattle, this issue of the Journal of Electricity is affectionately dedicated, in recognition of his vital share in electrifying the Chicago, Milwaukee & St. Paul Railroad over the continental divide, an achievement in which once more the West leads the way, blazing the trail for others to follow.

Three thousand of these letters will be sent out, and to every favorable answer received ten pledge cards will be sent which will be distributed, signed and returned. By this plan the engineers believe they will be doing their bit to elect an engineer, whom they believe to be the best available man, to the White House.

Seattle Section, A. I. E. E.

Seattle Section of the American Institute of Electrical Engineers met at the Arctic Club assembly room on March 16, 1920, with forty members and five visitors present. Chairman Quinan announced the appointment of the following men on the membership committee: P. B. Munson, E. J. Des Camp, G. H. Smith, E. H. Marriott, D. C. Barnes. Mr. Terrell, chairman of the papers committee, announced that the April meeting would be a city light meeting with three short papers. F. R. Nicholson, locating engineer, will present some new features in connection with the Cedar Falls pipe line. W. J. McKeen will discuss some new features of power house design which are being inaugurated at Cedar Falls. G. H. Smith will give a paper on the new type of distribution system which the City Lighting Department is putting in operation at this time. The trip to Cedar Falls will be conducted on Saturday, May 1st, when it is planned to visit the Milwaukee substation, observe an electric locomotive and also visit the generating station of the lighting department. The New York office has defined the territory of the section as extending in a 60-mile radius around Seattle. The section feels that it is entitled to more territory and suggests that the jurisdiction extend half-way to Spokane, Portland, and Vancouver, B. C. A motion was made and carried that the executive committee be instructed to take up the matter with the New York office.

Thomas E. Phipps, formerly chief engineer for the Public Service Commission of the state of Washington, presented a timely and interesting paper on Elements for Consideration in Valuations.

Commercial Section Committee Organized

The Governing Committee of the Commercial Section of the Northwest Electric Light & Power Association held its first meeting a short time ago in Seattle. A plan of work for this committee was outlined and it was suggested that the commercial efforts of every central station member of the organization could well be devoted in an effort to profit by the past few years' experience of every member of the company. It was further suggested that the future thought of this committee be directed especially towards means of conserving company resources and increasing efficiency.

A. I. E. E. Membership, San Francisco

Following are the names of those composing the membership committee of the San Francisco section, A. I. E. E., from whom may be obtained application blanks and booklets which describe the Institute and its activities:

Ralph S. Twogood, engineering department, Southern Pacific Co., San Francisco.
F. C. Platt, Pacific Gas & Electric Co., San Francisco.
H. P. Bell, Key System Bldg., Oakland, Cal.
Adrian L. Anderson, Federal Telegraph Co., Palo Alto, Cal.
E. Bachman, General Electric Co., San Francisco.
L. N. Robinson, Stone and Webster, San Francisco.
H. S. Lane, Pacific Gas & Electric Co., San Jose, Cal.
Gaskell S. Jacobs, Railroad Commission, State of California, San Francisco.
G. L. Scoville, The Pacific Tel. & Tel. Co., San Francisco.
E. V. Calderwood, The Pacific Tel. & Tel. Co., San Francisco.
C. A. Turner, The Pacific Tel. & Tel. Co., San Francisco.

Although these engineers compose the membership committee, each member having the Institute's activities and progress at heart is invited to consider himself a member of this committee and lend his efforts accordingly. The chairman of the membership committee will gladly add the name of any member who may volunteer in this work.

San Francisco Electrical Development League

The March 15th meeting of the San Francisco Electrical Development League was presided over by Mr. S. V. Lisberger, who as chairman of the day spoke of load conditions in the East, remarking upon the fact that there have been several severe burn-outs in the large cities of the East, crippling whole sections for several hours at a time, due to the heavy over-loading of all lines. The increase in the load has been phenomenal and shows an increase of 25% where practically no increase was expected—the Chicago Commonwealth Edison Company reaching its peak one afternoon with a load of 448,000-kw.

Mr. Lisberger then went ahead to tell of the committee which is now working on a new set of rules to embody the present "Electrical Utilization Safety Orders" issued by the Industrial Accident Commission of California, and the "National Electrical Code" as recommended by the National Fire Protective Association.

The committee, of which Mr Lisberger is the chairman, was carefully selected and men who were thoroughly familiar with the practical and theoretical side of the subject they were to formulate.

Mr. Carl E. Hardy, city electrician of Oakland, next spoke on the policy of the committee, explaining and amplifying the formal resolution as adopted by the committee. The resolution as adopted reads as follows:

Whereas, It is highly desireable to provide a single set of rules and requirements embodying the present "Electrical Utilization Safety Orders" issued by the Industrial Accident Commission of the State of California, and the "National Electrical Code," as recommended by the National Fire Protection Association; and

Whereas, The continuation and recognition of existing national standards for fittings and material, as well as the methods of installation, is of the utmost importance; therefore be it

Resolved, That these principles are hereby adopted by this committee as its policy, and that all rules and requirements proposed by subcommittee comply with the following:

1st: That the present form of the "Code" and "Safety Orders" be disregarded and a new form adopted providing for the grouping of all rules relating to a subject under the title of that subject; also that the subject titles relate to the classification of the installation such as "service" "Motors," "Fixtures," etc., and not as to materials used.

2nd: That in order to permit cities, towns or other political subdivisions to require within the rules and requirements such higher grades of installations as determined shall provide minimum requirements and shall include recommendations for major requirements, thus permitting a selection within the rules in such instances.

3rd: That all rules be written in language clearly understood by an average electrical worker, be mandatory in form and explicit in requirement.

4th: That in the preparation of rules and regulations by subcommittees, there be a minimum deviation from present practice except such rules recommended by subcommittee and approved by general committee.

5th: That the specifications for fittings and material contained in Class "D" of the "National Electric Code" be unchanged and provision directly made for recognition of the labels issued by the Underwriters' Laboratories, both fire and accident with provision for condemnation of substandard and unsafe devices.

Mr. Arthur Kempton, Chief of Department of Electricity of San Francisco, in speaking for Mr. C. W. Mitchell, Electrical Engineer, Board of Fire Underwriters and a member of the National Electric Code Committee, told of some of the recommendations to be made in changing the National Electric Code this year, some of which were:—

All switches on motors to be enclosed and externally operated. Also all bare parts to be protected or covered. Poly-phase motors to be equipped with an overload trip on each phase. Fuses not to exceed 110% of capacity of motor as indicated on the motor name plate. Circuit breakers to be installed on all motors—time circuit breakers not to be over 110% of rated capacity of motors but if circuit breaker is of instantaneous type may be set at 140%. Switchboards of dead face type only, to be allowed in theatre installations. Increase allowed in size and number of conductors run in conduits. 50 volts limit for farm lighting units. Permit use of varnish cloth as insulation on wire not less than No. 6.

Approved stands or warning lights to be sold with flat-irons, sad-irons or any iron used on combustible material, to reduce the fire hazard.

Mention was made of the fact that several of the manufacturers were concerned lest the California Industrial Accident Commission set up a separate laboratory to make unusual requirements for their products, but it is the idea of the Industrial Accident Commission only to require the recognition of the labels issued by the Underwriters Laboratories, both fire and accident with provision for

condemnation of substandard and unsafe devices, as stated in the resolutions of the committee.

Section 1. Members of the Association shall regard themselves as being engaged in a business on which there is a well defined duty and obligation toward the public and themselves. The business demands that members use every honorable means to uphold the dignity and honor of this vocation, to exalt its standards and to extend its spirit of usefulness.

Section 2. Every member of this Association should be mindful of the public welfare and should participate in those movements for public betterment in which his special training and experience qualify him to act. He should not, even under his client's instruction, engage in or encourage any practices contrary to the Rules and Regulations Safeguarding Life and Property, for as he is not obliged to accept a given piece of work, he cannot, by urging that he has followed his client's instruction, escape the condemnation attaching to his act. Every member of this Association should support all public officials and others who have charge of enforcing safe regulations in the rightful performance of their duty. He should carefully comply with all the laws and regulations touching his vocation, and if any such appear to him unwise or unfair, he should endeavor to have them altered.

Section 3. It is unbusinesslike for a member of this Association to assist unqualified persons to evade or to lend himself in the evasion of any of the recognized rules and regulations governing electrical work.

Section 4. Members of this Association should expose without fear or favor, corrupt or dishonest conduct and practices of the members of their business, and it is their duty to bring to the attention of the proper authorities the existence of electrical conditions which are unsafe to life and property.

Section 5. Members of this Association owe a duty to the business, of refusing to furnish estimates to general contractors who do not regard bids as final and binding, upon which they are awarded general contracts.

Section 6. Members of this Association shall not falsely nor maliciously injure, directly or indirectly, the business reputation, prospects or business of a fellow member of this Association.

Section 7. Members of this Association shall not attempt to supplant a fellow member after definite steps have been taken toward the letting of a contract to him. Nor should they offer any interference in the carrying out of the said contract or commission to the end that loss or damage may result to the fellow member. Each member should realize that he is a business man and anxious to succeed, but that first he is an ethical man, and wishes no success that is not founded on the highest justice and morality.

Section 8. When called to figure work on a job in which there is a doubt whether or not the original contract is finished, do as you would like to be done by and call up your fellow members and see what the conditions are.

Section 9. Attend the weekly meeting with the same faithfulness that you put into your business, remembering that the officers and those who do attend regularly are doing so for your benefit as well as theirs, and as our Association is strictly to educate its members in business methods, you are not only injuring yourself but the entire trade by not availing yourself of all opportunities for education afforded by our organization.

Section 10. Always remember that confidence begets confidence.

Oregon Chapter, American Association of Engineers

The regular meeting of the Oregon Chapter, American Association of Engineers, was held at 8:15 p.m. Friday evening, March 12th, at the club rooms, Tilford Building, Portland. After much discussion it was decided to support one or more engineers, should any be candidates for election, to the next legislature, because a large part of the money spent by the legislature is for engineering work. With the big road-building program, the control of the waters of the state and the proposed increase in size of the state college and university before it, the next session of the legislature will need engineers and architects on the floor of the house, argued the association members.

The following committee has been appointed to make a report on the educational mileage tax, and to visit the Oregon Agricultural College and survey the needs of the engineering departments, reporting back to the society their findings: Fred D. Weber, chairman, O. Lauregaard, E. W. Lazell, D. C. Henny, and F. S. Baillie.

A. S. M. E., San Francisco

The meeting of the San Francisco branch of the American Society of Mechanical Engineers, on March 4th, was preceded by a dinner which was attended by over fifty members of the society. After dinner the members proceeded to the Engineers' Club where Mr. Miner Chipman, well known for his works on sociology, had been secured by Secretary Kinkead to give the address of the evening on the "American Plan of Shop Management." Mr. Chipman showed the reasons why the American plan had been adopted by shops throughout the country and gave concrete examples of how it was being tried out successfully. Mr. Chipman was followed by F. C. Metcalf, secretary of the California Metal Trades Association, who showed why the association had been forced to adopt a similar plan after failing to come to an understanding with the labor unions.

As a result of the discussion that followed, many minor points were brought out which showed that while all of the members were not in favor of the plan in its entirety, it certainly offered one logical solution of the present difficulties confronting the large employer of labor.

Among those present were:

President W. F. Durand, Secretary J. A. Kinkead, J. P. Rettenmayer, Miner Chipman, F. H. Metcalf, Prof. E. P. Lesley, Frank Duley, R. A. Balzari, Henning J. Berg, Bruce Lloyd, H. A. Olds, H. Hoffman, M. A. Cutten, J. Lynn Reynolds, Orvill Logan, A. C. Maynard, Howard C. Norton, M. R. Hickman, W. Hanscom, R. S. Springer, F. A. Blakeslee, John T. Johnston, P. Swanson, W. Edwards.

Central Station Day at Development League

At the March 22nd meeting of the San Francisco Electrical Development League central stations held sway, but a member of the Railroad Commission held control of them as usual by the kindly offices of Sergeant-at-Arms Jacobs. President E. O. Shreve announced the following committees before listening to the optimistic, stock-boosting talks of the various power companies' representatives:

General Committee for reception and entertainment of Eastern guests on the N. E. L. A. Red Special: H. F. Jackson, chairman, R. E. Fisher, vice-chairman, T. E. Harris, J. M. Black, R. A. Balzari, A. H. Elliot, Robert Sibley.

Finance Committee: Chas. Newberry, chairman, E. C. Kensey, W. B. Francis.

Membership Committee: Harry F. Hall, chairman, Emmet N. Britton, Tracy W. Simpson, F. A. Anderson, J. E. Gridley, W. R. Dunbar, G. G. Drew.

Reception and Attendance Committee: H. S. Jones, chairman, G. E. Armstrong, Earl P. Durley, H. H. Millar, Walter F. Price.

Publicity Committee: H. C. Hopkins, chairman, M. P. Dolman, M. E. Hixson.

Sergeant-at-Arms: A. H. Halloran, chairman, Tracy W. Simpson, R. E. Fisher, Garnett Young.

Public Policy Committee: R. E. Fisher, chairman, Robert Sibley, D. E. Harris, Tracy Simpson, Garnett Young.

Program Committee: F. E. Boyd, chairman, H. Bostwick, R. E. Balzari, C. F. Butte, G. Jacobs, C. E. Ingalls, A. E. Rowe, W. B. Sawyer, R. J. Holtermann.

Mr. G. E. Armstrong, associate editor of the Journal of Electricity, was the chairman of the day and spoke briefly on the construction budgets of the power companies of California, which amount to fifty millions of dollars to be spent this year.

Capt. H. F. Jackson, vice-president of the Pacific Gas & Electric Company, spoke on the four projects which his company now have under way. By adding a third pipe line to the Sierra and San Francisco power house on the Stanislaus river the present pipe line loss will be reduced, and without any more water the plant will have an added capacity of 7,000 kw. This work will be finished by early fall. In utilizing a natural fall of 2500 feet on the south fork of the Stanislaus river 9,000 kw. will be added to the output of the system and a new record set for high-head hydroelectric plants in California. The first unit of the Pit river project will be completed by the end of the year and will consist of two 12,000-kw. turbines operating under a two hundred-foot head on the lower Pit. The fourth project will consist of a 12,500-kw. steam turbine which will probably be installed in Oakland by October.

The Great Western Power Company was represented by J. M. Black, sales manager, who spoke of the large development on the Feather river and the Caribou plant which will eventually generate 120,000 kw. The present installation, however, which will be finished by the end of the year, will consist of two 20,000-kw. generators. The transmission as far as Valona will be at 165,000 volts, and there it will be stepped down to 60,000 volts for further distribution.

In the absence of Mr. F. E. Hoar, consulting engineer of the Southern Sierras Power Company, Mr. Armstrong told of the contemplated additions to their small plants to the extent of approximately 4,000 kw.

Mr. Armstrong also told of the developments under way of the Southern California Edison Company, including the installation of a 30,000-kw. steam turbine at the Long Beach plant, one additional 16,000-kw. generator in Big Creek No. 2 plant, and the construction of Big Creek No. 8 with a capacity of 22,500 kva., which will be in operation inside of a year.

The installation of an additional 30,000-kw. unit in the Kern River No. 3 plant is being contemplated for this year also. The progress made on Shaver Lake will insure 46 million kw-hr. during 1921, which will be further swelled by the one hundred million kw-hr. from the Big Creek No. 8 plant.

Mr. A. Emory Wishon, assistant general manager of the San Joaquin Light & Power Corporation, was unable to attend the meeting, but sent a telegram of greetings and named Mr. Robert Sibley, editor of the Journal of Electricity, as his proxy. Mr. Sibley told of the growth of the San Joaquin Light & Power Corporation which has probably the greatest irrigating load in the world to its present installed capacity in twelve plants of 84,000 hp. The plans for 1920 are such as to nearly double the output of the company, the largest of the new developments being the Kerckhoff plant with an output of 45,000 hp. One unit of 17,500 hp. is being added to the Bakersfield steam plant which will more than double its capacity and another natural gas burning steam plant of 12,500 or 15,000 kw. is to be installed in the newly discovered gas fields of the Elk Hill territory. The Kings River development of 30,000 kw. will be completed in 1922 and other future developments include the rebuilding of the Kern River plant, giving it an output of 25,000 hp., rebuilding of the Tule River plant and the raising of the Crane Valley dam.

A. I. E. E. and N. E. L. A., Portland

The regular joint monthly meeting of the Portland sections of the A. I. E. E. and N. E. L. A. was held Tuesday, March 9th, at 8 p.m., in the auditorium of the University Club. The speaker of the evening was Mr. W. H. Crawford, manager of department of industries of the Portland Chamber of Commerce, and his subject was the Industrial Development of the Portland District.

The proposed Constitution of the Oregon Technical Council was read and adopted by both local sections, as follows:

ARTICLE I (A)

The name of the organization shall be The Oregon Technical Council.

ARTICLE I (B)

The purpose of this Council is to coordinate the work of the various technical, scientific and engineering organizations, to promote the welfare and professional standing of their members and to foster a more general recognition of the engineer in civic matters.

ARTICLE II (A)

The charter membership of this Council shall consist of two appointed representatives from each local section of the following national engineering societies: The American Society of Civil Engineers, the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, the American Institute of Mining Engineers and the American Institute of Architects.

ARTICLE II (B)

Other technical, scientific or engineering organizations desiring to secure membership in the Council shall file with the Secretary thereof a petition accompanied by a copy of their constitution and a list of their officers and members. Membership in the Council shall be granted only by at least three-fourths affirmative vote of the members present at two successive meetings.

ARTICLE II (C)

Each organization shall have two representatives in the Council and may elect two alternates to serve in the absence or disability of such representatives.

ARTICLE II (D)

To insure permanency in the representation on the Council, member organizations shall arrange the initial election of their representatives so that their terms of office shall overlap at least six months.

ARTICLE III (A)

At the first regular session in each calendar year, the Council shall elect a President, Vice-President, Secretary-Treasurer, and two Directors. These five shall constitute the Executive Committee. No organization shall have more than one representative on the Executive Committee.

ARTICLE III (B)

Regular sessions of the Council shall be held once each month at such time and place as the Council shall designate.

ARTICLE III (C)

The president shall call special sessions of the Council upon written request of not less than two members of the Executive Committee.

ARTICLE III (D)

A quorum for the transaction of official business shall consist of at least one representative from two-thirds of the member organizations.

ARTICLE IV

Any member organization may be expelled from the Council for cause upon a three-fourths ballot of all members of the Council.

ARTICLE V

Such by-laws and rules as may be necessary for the future governing of the Council may be proposed at any regular meeting.

ARTICLE VI

Amendments to this constitution shall be proposed or approved by the Council, submitted to the member organizations for ratification and adopted upon a two-thirds favorable vote of such member organizations.

WHERE THE MEN OF THE INDUSTRY MEET

(The place where you can find where and when the other man meets. Information as to changes in officers, or additions or corrections, should be addressed to the Service Editor, Journal of Electricity. It is hoped to keep this directory up to date, so that travelers in a strange town who wish to attend the meetings of allied groups may not me misdirected.—The Editor.)

A. I. E. E.—WESTERN SECTIONS

National Officers
President—Calvert Townley, Westinghouse Electric & Manufacturing Company.
Secretary—F. L. Hutchinson, Engineering Society, Bldg., New York City.
Meetings—Monthly.

Denver Section
Chairman—Prof. H. S. Evans, Univ. of Colorado, Boulder.
Secretary—Robt. B. Bonney, Mountain States Tel. & Tel. Co., Denver, Colo.
Meetings—Third Saturday of each month, at the Shirley Hotel.

Los Angeles Section
Chairman—Clem. A. Copeland, Bureau of Power and light, Los Angeles.
Secretary—R. W. Sorensen, California Institute of Technology, Pasadena, Cal.
Meetings—Second Tuesday of each month.

Portland Section
Chairman—E. F. Whitney, General Electric Co., Electric Bldg, Portland, Ore.
Secretary—W. C. Heston, Portland Ry. Light & Power Co., Portland, Ore.
Meetings—Monthly.

San Francisco Section
Chairman—W. G. Vincent, 445 Sutter St., San Francisco.
Secretary—Allen G. Jones, Rialto Bldg., San Francisco.
Meetings — Fourth Friday each month—Engineers' Club, 7 p.m.

Seattle Section
Chairman—G. E. Quinan, Puget Sound Traction Light & Power Co., 205 Electric Bldg.
Secretary—Willis T. Batcheller, Seattle Light & Power System, Seattle, Wash.
Meetings—Monthly on third Tuesday in Chamber of Commerce Assembly Room, 9th floor, Arctic Bldg.

Spokane Section
Chairman—J. E. E. Royer, Washington Water Power Co., Spokane, Wash.
Secretary—Foster Russell, Symons Bldg., Spokane, Wash.
Meetings—Third Friday of each month.

Utah Section
Chairman—Markham Cheever, Utah Power & Light Co., Salt Lake City, Utah.
Secretary—T. A. Purton, General Electric Co., Newhouse Bldg., Salt Lake City, Utah.
Meetings—Third Wednesday of alternate months, 8 o'clock. Assembly Room of Commercial Club, Salt Lake City.

Vancouver Section
Chairman—R. F. Hayward, Western Canada Power Co., Ltd., Vancouver, B. C.
Secretary—T. H. Crosby, Canadian Westinghouse Co., Vancouver, B. C.

A. I. E. E.—WESTERN BRANCHES

Idaho University Branch
Meetings — First Wednesday evening of each month from October to June.

Montana State College Branch
Secretary—J. A. Thaler, Montana State College, Bozeman, Mont.
Meetings—Third Friday of every month of the school year in the Electrical Bldg.

Oregon Agricultural College Branch
Chairman—Lawrence Fudge, Oregon Agr. College, Corvallis, Ore.
Secretary — Otto L. Cantrall, Oregon Agr. College, Corvallis, Ore.

Stanford University Branch
Chairman—Aubrey Smith, Box 121, Stanford University.
Secretary—Hans O. Storm, Encina Hall, Stanford University.

State College of Washington Branch
Chairman—Clarence E. Guse, Pullman.
Secretary—Ralph C. Guse, State College of Washington, Pullman.
Meetings—Bimonthly at Mechanics Art Bldg., Pullman, Wash.

California Institute of Technology Branch
Chairman—R. M. Otis, Throop Dormitory, Pasadena, Cal.
Secretary—D. D. Smith, Cal. Inst. of Tech., Pasadena, Cal.

University of California Branch
Chairman—H. C. Silent, University of California, Berkeley, Cal.
Secretary—M. L. Almquist, University of California, Berkeley, Cal.

University of Colorado Branch
Chairman—D. H. Rymer.
Secretary—Lee J. Murray.
Meetings—First and third Thursdays of each month of the school year in the Engineering Building, University Campus.

University of Washington Branch
Chairman—G. R. Rice, Univ. of Washington, Seattle, Wash.
Secretary—McKinley Donovan, Univ. of Washington, Seattle, Wash.
Meetings—Monthly, first Tuesday, Forestry Bldg.

CONTRACTOR-DEALER ASSOCIATIONS

National Association of Electrical Contractors and Dealers
Chairman—W. Creighton Peet.
Secretary—W. H. Morton, 110 West 40th St., New York.
Executive Committeemen, Pacific Division—J. R. Tomlinson, Portland; J. F. NePage, Seattle.

British Columbia Ass'n Electrical Contractors and Dealers
President—E. Brettell, Vancouver, B. C.
Secretary—R. G. Hargreaves, 422 Pacific Bldg., Vancouver, B. C.
Meetings—First Tuesday of each month.

California Ass'n of Electrical Contractors and Dealers
Chairman—Clyde L. Chamblin, 641 Mission St., San Francisco, Cal.
Secretary—J. W. Redpath, New Call Bldg., San Francisco, Cal.

California Sections

East Bay Electrical Trades Association
President—Hugh Kimball, 526—13th St., Oakland, Cal.
Secretary—J. M. Gregory, Woodmen od the World Bldg., 16th & Clay St., Oakland, Cal.

Electrical Contractors and Dealers Ass'n of San Francisco
President—T. J. Bennett, Rex Electric Co., San Francisco.
Secretary—Louis R. Ardouin, San Francisco.

Imperial Valley Section
President—Jerome Aiken.
Secretary—R. O. Graham, 123 Second St., Calexico, Cal.

Kern County Section
President—A. K. Carsen.
Secretary—H. J. Anderson, Taft, Cal.

Long Beach Section
President, J. W. Lane.
Secretary—A. R. Dunn, 233 East Third St., Long Beach, Cal.

Monterey Bay Electrical Contractors and Dealers
President—W. Cox, Santa Cruz.
Secretary—D. K. Noggle, Monterey.

Northern California Electrical Contractors and Dealers
President—W. H. Gribble, Sacramento.
Secretary—H. Berg, Sacramento.

Orange County Section
President—W. B. Holland, Alaheim, Cal.
Secretary—H. J. Snow, Orange, Cal.

Orange Belt Section
President—E. J. Field.
Secretary—H. A. Snyder, 337 F Street, San Bernardino, Cal.

Sacramento Section
President—J. C. Hobrecht.
Secretary—Jas. Woods, 1110 J Street, Sacramento.

Santa Clara Section
President—Chas. Faser, 10 S. 10th St., San Jose.
Secretary—P. D. Cambiano, 161 S. 2nd St., San Jose.

San Diego Section
President—J. H. Leavitt.
Secretary—J. F. Zwiener, 995 So. St., San Diego.

San Joaquin Section
President—H. H. Courtright.
Secretary—Clyde Smith, 1230 J St., Fresno.

San Mateo Section
President—H. B. Weaver
Secretary—M. E. Ryan, 205 Main St., Redwood City.

Southern California Electrical Contractors and Dealers
President—G. E. Arbogast, 724 So. Olive St., Los Angeles, Cal.
Secretary, Assistant—H. M. Mikesell, 628 Union Bldg., Los Angeles, Cal.

Denver Electrical Contractors' Association
President—E. C. Headrick.
Secretary—C. N. Shannon, 227 Coronado Bldg.
Correspondence Secretary—L. B. Roberts, 227 Coronado Bldg., Denver, Colo.
Meetings, 2nd and 4th Monday nights of each month.

Electrical Contractors & Dealers of Salt Lake City
President—G. W. Forsberg.
Secretary—E. H. Eardley, Eardley Bros., Salt Lake City.
Meetings—Saturdays, 1 p.m.

Oregon State Ass'n of Electrical Contractors and Dealers
President—R. C. Kenney, 388 Burnside Street, Portland.
Secretary—U. P. Mundt, Portland, Ore.

Portland Local Ass'n of Electrical Contractors and Dealers
President—Roy C. Kenney, Portland.
Secretary — H. C. Jones, 306 Concord Bldg., Portland.
Meetings—Alternate Mondays at Imperial Hotel Grill.

Washington Ass'n of Electrical Contractors and Dealers
President—V. S. McKenny, NePage & McKenny Co., Armour Bldg., Seattle, Wash.
Secretary—Forrest E. Smith, Seattle, Wash.
Meetings — Quarterly—second Thursdays of March, June, September and December.

JOBBERS' ASSOCIATIONS

Electrical Supply Jobbers Association
General Secretary—Franklin Overbagh, 411 So. Clinton St., Chicago, Ill.
Meetings—Semi-annual.

Pacific Coast Electrical Supply Jobbers
President—T. E. Bibbins, 575 Mission St., San Francisco.
Secretary—Albert H. Elliot, 544 Market St., San Francisco.
Meetings—Quarterly.

Electrical Credit Ass'n of the Pacific Coast
President—J. H. Zweifel, Electrical Appliance Co., San Francisco.
Secretary—Albert H. Elliot, 544 Market St., San Francisco.
Meetings—Annually; San Francisco; May.

OF ELECTRICAL INTEREST

California Electrical Cooperative Campaign
Chairman Advisory Committee—L. H. Newbert, 445 Sutter St., San Francisco.
Secretary—Captain Howard Angus, New Call Bldg., San Francisco.

Colorado Electric Light, Power and Railway Association
President—E. A. Phinney, Jefferson Co. Power & Light Co.
Secretary-Treasurer—F. P. Safford, Denver Gas & Electric Co., Denver, Colo.

Electric Cooperative League of Los Angeles
President—Ralph B. Clapp, San Fernando Bldg., Los Angeles.
Secretary-Treasurer—Carl M. Heintz, Westinghouse Electric & Mfg. Co., Los Angeles.

Electric Metermen's Association
President—J. E. Bridges, Westinghouse Electric & Manufacturing Company.
Secretary—A. E. Coney, Great Western Power Company, San Francisco.
Meetings—About every 60 days.

Illuminating Engineering Society
President—S. E. Doane.
Secretary—Clarence L. Law.
Western Representatives—Romaine Myers, Bacon Bldg., Oakland, Cal.; C. M. Masson, Edison Bldg., Los Angeles; F. H. Murphy, Portland Railway Light & Power Co., Portland, Ore.; W. R. Putnam, Utah Power & Light Co., Salt Lake City; Fred A. Osborn, University of Washington, Seattle, Wash.
Meetings—First Tuesday each month.

Natiqnal Electric Light Association
President—R. H. Ballard, Southern California Edison Company.
Secretary—T. Comerford Martin, 29 West 39th St., New York.

New Mexico Electrical Association
President—E. A. Roberts, Public Utilities Co., Carlsbad, New Mexico.
Secretary—Chas. E. Twogood, Albuquerque Gas & Electric Company, Albuquerque, N. Mex.

Northwest Electric Light and Power Ass'n
President—John B. Fisken, Washington Water Power Company.
Secretary—L. A. Lewis, Spokane, Wash.
Meetings—Convention held annually. Executive Committee, governing body of Association, meets upon call of its chairman.

Pacific Coast Section, N. E. L. A.
President—A. E. Wishon, San Joaquin Light & Power Corporation, Fresno, Cal.
Secretary—A. H. Halloran, Journal of Electricity, Rialto Bldg., San Francisco.
Meetings—Annually, in April.

Portland Section, N. E. L. A.
Chairman—F. H. Murphy, Portland Railway Light & Power Company.
Secretary—Geo. Bowen, Portland, Ore.

San Francisco Electrical Development League
President—E. O. Shreve, General Electric Co., San Francisco.
Secretary—R. D. Compton, Pacific Gas & Electric Co., San Francisco, Cal.
Meetings—Every Monday, 12:10 p.m.; luncheon, Palace Hotel, San Francisco.

Southwestern Electrical and Gas Association
President—W. A. Sullivan, Shreveport, La.
Secretary—H. S. Cooper, 403 Slaughter Bldg., Dallas, Texas.

Synchronous Club
Secretary—H. N. Beecher, City Hall, Los Angeles.

Telephone and Telegraph Society of the Pacific Coast—San Francisco Section
President—W. H. Brommage, Pacific Tel. & Tel. Co., San Francisco.
Secretary—Chas. H. Dobson, 835 Howard St., San Francisco.

MECHANICAL ENGINEERS

National Officers
President—Mortimer E. Cooley, Electrical Engineering Dept., Ann Arbor, Mich.
Secretary—Calvin W. Rice, Engineering Society Bldg., New York City.

Los Angeles Section, A. S. M. E.
President—Charles H. McGuire.
Secretary—T. J. Royer.
Meetings—Quarterly.

Oregon Section, A. S. M. E.
President—B. C. Hall, Willamette Iron & Steel Works.
Secretary—E W. Lazell, Chem. & Efficiency Engr., 537 Railway Exchange Bldg., Portland.

San Francisco Section, A. S. M. E.
President—W. F. Durand, Stanford University, Palo Alto, Cal.
Secretary—Jas. A. Kinkead, Rialto Bldg., San Francisco.
Meetings—Quarterly.
Thursday lunches have been arranged at the Engineers' Club, 57 Post St.

Washington Section A. S. M. E.
President—E. O. Eastwood, Univ. of Wash.

AMERICAN ASSOCIATION OF ENGINEERS

National Officers
President—W. H. Finley, President Chicago & Northwestern Railroad.
Secretary — Frederic Bass, 29 S. La Salle St., Chicago.

Los Angeles Chapter, American Ass'n of Engineers
President—E. G. Shiebley.
Secretary—A. L. Harris, Central Bldg., Los Angeles.

Oregon Chapter, American Ass'n of Engineers
President—W. H. Marsh.
Secretary—R. W. Barnes.

Pacific Northwest Society of the American Ass'n of Engineers
President—S. D. Clinton, Vulcan Iron Works.
Secretary—J. A. Hopkins, Seattle Boiler Works.

San Francisco Chapter, American Ass'n of Engineers
President—William S. Wollner.
Secretary—A. G. Mott.

ENGINEERS' SOCIETIES

Engineers' Club of Oakland
President—R. S. Chew, Oakland Chamber of Commerce, Oakland, Cal.

Engineers' Club of Sacramento
President — George S. Nickerson, 914 Forum Bldg., Sacramento.
Secretary—P. M. Noeboe, State Department of Engineering, Forum Bldg., Sacramento, Cal.

Engineers' Club of San Francisco
President — Ely C. Hutchinson, Pelton Water Wheel Company, San Francisco.
Secretary—Allen G. Jones, Rialto Bldg., San Francisco.
Annual Meeting—October.

The Engineers' Club of Seattle
President—H. E. Horrocks, Seattle, Wash.
Secretary—E. J. Bartells, Northern Life Bldg., Seattle, Wash.
Meetings—Thursday noon at the club rooms at 410 Arctic Bldg. A buffet luncheon is served every day. A special welcome is extended to all engineers visiting the city.

JOINT ORGANIZATIONS

Colorado Engineering Council
President—Arthur Ridgway, 810 Equitable Bldg., Denver.
Secretary-Treasurer—Robert J. Grant, 614 Interstate Trust Bldg., Denver.

Joint Committee Technical Societies of Los Angeles
Chairman—George A. Damon, San Fernando Bldg., Los Angeles.
Secretary—W. K. Barnard, 705-6 Central Bldg., Los Angeles.

Joint Council of the Soceities of San Francisco
Chairman—C. D. Marx, Stanford University.
Secretary—Nathan Bowers, Rialto Bldg., San Francisco.

Spokane Engineering and Technical Ass'n
President—L. K. Armstrong, A. S. M. E.
Secretary—A. D. Butler, City Engineer, Spokane, Wash.
Meetings—Third Friday of each month. Joint with A. S. C. E., A. I. E. E. and A. S. M. E.

MISCELLANEOUS

American Ass'n for the Advancement of Science—Pacific Division
President—John Campbell Merriam, University of California; Acting Chairman National Council of Research.
Secretary (acting)—J. R. Douglas, 430 Library, University of California, Berkeley, Cal.
Meetings—Annual.

Foreign Trade Club
President—W. H. Hammer, Monadnock Bldg., San Francisco.
Secretary—Aubrey Drury, Monadnock Bldg., San Francisco.
Meetings—238 Merchants Exchange Bldg., San Francisco. Every Wednesday evening.

Idaho Society of Engineers
President — W. H. Gibson, Mountain Home, Idaho.
Secretary—Ira F. Shaffner, Boise, Idaho.

Pacific Coast Gas Association
President—A. B. Day, Los Angeles Gas & Electric Co.
Secretary—Henry Bostwick, 445 Sutter St., San Francisco.

Society for Promotion of Engineering Education
Secretary—H. J. Bishop, University of Pittsburg, Pittsburgh, Pa.

Utah Society of Engineers
President—Leonard Cahoon
Secretary—Wm. H. Kelsey.
Meetings—3rd Wednesdays except May, June, July and August.
Annual Banquet—May.

HAPPENINGS IN THE INDUSTRY

DEMONSTRATION OF WESTERN RAILWAY ELECTRIFICATION

The departure of the first Milwaukee Olympian on the Pacific Division of the Chicago, Milwaukee & St. Paul Railroad was observed by a party of more than a hundred railroad and transportation officials in addition to prominent Seattle and Tacoma citizens who traveled as guests on a special train. This demonstration, the first actual operation of the electrified system, began at 9:30 on the morning of March 5th when the special train, pulled by a steam engine, left the Oregon-Washington depot at Seattle. The Olympian followed a few minutes later, a limited train also hauled by a steam locomotive. At Renton junction two electric locomotives waited. At this point starts the electric trolley, which stretches more than 200 miles over the mountains to Othello. Here the electric locomotive was coupled to the special train. A few moments afterwards another electric locomotive was coupled to the Olympian. With the special train and its guests in the lead and the Olympian following, the current from a 3000-volt overhead trolley was turned into the locomotive motors. A speedy momentum was quickly attained and the train sped up the foothills past Renton and Maple Valley to Cedar Falls, where a stop was made while guests and officials inspected the sub-station of the Milwaukee system. This station is fed by 160,000 volts of alternating current. The following guests had passage on the train:

Officials of the Puget Sound Traction, Light & Power Company: A. W. Leonard, W. J. Grambs, D. C. Barnes, John Harisberger, R. T. Sullivan, George Newell, H. B. Sewall, George Quinan, H. J. Gille, E. A. Batwell, E. H. Thomas, W. H. Somers and Judge C. W. Howard.

Milwaukee railroad officers: Vice-President H. B. Earling, Macy Nicholson, general manager; J. L. Brown, assistant superintendent; J. R. Vietch, assistant traffic manager; R. Beeuwkes, chief electrical engineer; F. B. Walker, H. W. Williams, F. L. Tavenner, A. P. Chapman, W. L. Hubbard, E. F. Weeks, J. F. Bahl, A. J. McCarthy and R. F. Randall, all of Seattle; E. A. Lalk, F. J. Alleman and F. C. Dow, of Tacoma; and W. P. Warner, of Spokane.

Seattle railroad and transportation men from other lines: W. H. Olin, O-W. R. & N.; G. W. Mertens, general manager Pacific Coast line; R. Herzog, Great Northern (chief engineer); H. R. Williams, A. I. Bouffleur, M. B. Childs, W. C. Dawson, C. D. Phillips, A. F. Marion, O. S. Bowen, A. R. Cook and Charles E. Peabody.

Tacoma guests comprised Maj. C. M. Riddell; M. F. Alexander, Admiral line president; J. T. Davis, president Commercial Club; I. B. Richards, general superintendent Northern Pacific; J. W. McCune, Commercial Club; M. Higuchi, O. S. K. line; A. M. Ingersoll, A. B. Howe, C. R. Welch, R. Pinkerton and Frank S. Baker.

Seattle guests were: S. H. Hedges, president Chamber of Commerce; Joseph Blethen, of the Times; Clark Nettleton, Post Intelligencer; R. H. Dean, Milwaukee line; John H. Longfellow, Journal of Electricity; J. B. Cox, E. E. Kimball and Allan W. Eshelby of the Westinghouse Electric & Manufacturing Company; Kenneth Kerr, Railway and Marine News; Claude A. Osler, Electric Railway Journal; W. A. Scott, Electrical Review, and S. Kaneko of the O. S. K. line.

Other guests were R. B. Childs, Intermountain Power Company, Butte; Rene Martin, Thomson-Huston Company, London; W. S. Elliott, general manager O.-W. R. & N., Spokane; W. H. Wingate, train master Chicago, Milwaukee & St. Paul Railroad, Tacoma; William Emerson, traveling engineer; Frank Busch, superintendent motive power, and R. J. Middleton, assistant chief engineer, Chicago, Milwaukee & St. Paul Railroad.

RECLAMATION PROJECT OUTLINED BY LANE

The Los Angeles Chamber of Commerce recently held a luncheon in honor of Franklin K. Lane, ex-Secretary of the Interior. At this time Mr. Lane gave an address on the task of harnessing the Colorado river. He believes this project would convert 1,500,000 unproductive acres into fruitful farms and orchards. It would be the most colossal irrigation project ever undertaken on the American continent. Mr. Lane summed up the entire outlook in saying:

"There are in the southwest today 1,500,000 acres which must lie idle until somebody with the money, coupled with the ability to organize engineering sense, undertakes to store the waters of the Colorado river and its principal tributaries all the way from Wyoming to the Grand Canyon, for the purpose of spreading it out over a vast expanse of unproductive acres, which the world will presently need.

"I have lately had engineers at work on a plan of my own, which contemplates making the Grand Canyon the greatest impounding reservoir the world has ever known. Can you offer any good reason why we can't break down the walls of the Grand Canyon, 100 miles this side of El Tovar, creating a gigantic irrigation water reservoir. Such a project would create the greatest dam of its kind in the world."

Mr. Lane made a very direct appeal to his audience when he said: "Why may I not challenge you gentlemen of Los Angeles to bring such pressure to bear upon Congress and upon the people of the United States that they will see an opportunity to do a great thing for this section of our land, and for all sections of our land, by making the Colorado

The above photo was taken while transportation officials were inspecting the Cle Elum Milwaukee substation in connection with the first electrification of the system. These men have made possible, through their efforts and progressiveness, the harnessing of the water power of western Washington so that it now moves transcontinental trains across the Cascade Mountains. The last man on the right is R. Beeuwkes, chief electrical engineer of the line.

river what it may be, the most useful single river of the United States in the amount of crops that it can be made to produce."

Mr. Lane's entire address was received with great enthusiasm.

PLANS FOR WATER POWER LEGISLATION

The Sacramento Valley Irrigation and Water Congress has perfected a permanent organization to expedite its program of water conservation and just distribution by means of legislation. The organization will make the following requests of the Legislature when it is next convened:

1—Creation by the Legislature of state conservation and flood control districts, embracing proper watershed areas.
2—State participation in financing and constructing water storage reservoirs.
3—State control of reservoirs and the apportionment of stored waters by state agencies.

Much opposition followed the introduction of a resolution by Fred Shaffer, Yolo county delegate, asking state authorities to apportion water for agricultural purposes in preference to hydroelectric companies during times of emergency. Shaffer's resolution, which was finally referred to the state relations committee, was intended to curtail the use of water by gold dredging outfits during periods of drought.

Proponents of the resolution asserted that hydroelectric companies are now furnishing gold dredgers in the Sacramento Valley with ten thousand horsepower, a force capable of irrigating approximately 200,000 acres of land. The resolution was opposed on the ground that the matter should be carefully studied by a committee before any action was taken that would tend to lessen the gold output at a time when it is needed by the nation.

ENLARGEMENT OF REFRIGERATING FACILITIES

To cope with the increase of California products, the Pacific Fruit Express is planning to spend two million dollars this year in enlarging its icing facilities. This is in addition to the 4,000 new refrigerator cars already announced which will cost between fifteen and sixteen million dollars. Regardless of the high cost of machinery, building materials and labor, the company is making an effort to provide shippers with the increased facilities they require for preservation and transportation of their products.

The contemplated improvements will include:

Roseville, California—Conversion of plant to electric drive, installation of additional 150-ton daily electric driven unit and extension of icing platform at a cost of $239,000.

Colton, California—Installation of additional 175-ton daily electric driven unit, and increase in day storage at a cost of $210,500.

Los Angeles—Conversion of steam plant to electric drive; installation of additional 100-ton daily electric driven unit and construction of 12,000-ton storage room.

Sparks, Nevada—Abandonment of the icing station at Truckee and the establishing of a regular icing station at Sparks for all shipments moving over the Southern Pacific under refrigeration. Construction of an electric driven artificial ice manufacturing plant of 150 tons daily capacity and 20,000 tons storage, costing $369,500.

AMERICAN ASSOCIATION OF ENGINEERS REDUCES ENTRANCE FEE

All members of National Engineering Societies may now join the American Association of Engineers at a reduced fee. The fee for such applicants is now five dollars instead of ten dollars. The membership now numbers thirteen thousand in the United States. The San Francisco chapter has over four hundred members.

Northwest Electric Light and Power Association

The personnel of the governing committee of the Public Relations Section of the Northwest Electric Light and Power Association has been named, as follows:

John A. Laing, Pacific Power & Light Co., Portland, Ore.
Geo. D. Brown, Wenatchee Valley Gas & Electric Co., Wenatchee.
Eugene Enloe, Okanogan Valley Power Co., Spokane, Wash.
N. W. Brockett, Puget Sound T. L. & Pwr. Co., Seattle, Wash.
O. G. F. Markhus, Idaho Power Co., Boise, Idaho.
Odell McConnell, Helena Light & Ry. Co., Helena, Mont.
R. M. Boykin, North Coast Power Co., Portland, Ore.

The governing committee of the Commercial Section of this association is made up of the following:

R. W. Clarke, Puget Sound T. L. & Pwr. Co., Seattle, Wash.
J. V. Strange, Pacific Power & Light Co., Portland, Ore.
A. C. McMicken, Portland Ry. L. & Pwr. Co., Portland, Ore.
J. S. Groo, Northwestern Electric Co., Portland, Ore.
J. F. Farquhar, Washington Water Power Co., Spokane, Wash.
W. R. Putnam, Idaho Power Co., Boise, Idaho.
J. Ryan Gaul, Montana Power Co., Butte, Mont.
O. P. Cull, Wash. Coast Utilities Co., Seattle, Wash.
R. E. Baily, Utah Power & Light Co., Salt Lake City, Utah.

The personnel of the governing committees of the Accounting, Hydroelectric and Technical Sections will be announced in the near future.

INCREASED OIL PRICES

The Standard Oil Company of California recently announced an increase of $0.25 per barrel in the price of fuel oil. Immediately thereafter a letter was addressed to K. R. Kingsbury, president of the Standard Oil Company, by the Raliroad Commission signed by all of the Commissioners, requesting that the Standard Oil Company make a statement as to the reasons for the increase in the price of crude oil, with the further statement that the increase in the price of oil would necessitate an increase in the rates to be charged for electricity and gas throughout the state. The primary intention of the Railroad Commission in writing its letter was to call attention to the need for remedial legislation that would give some public body the authority to review and fix prices of crude oil.

In reply to the Commission's letter Mr. Kingsbury made the following statement:

"The Pacific Coast's supply of fuel oil and of petroleum products is rapidly approaching exhaustion. Since May 1st, 1915, crude oil stocks in California have decreased from over 60,000,000 barrels to 28,738,921 barrels on March 1st, 1920. The available supply of crude oil in stock is today less than 13,000,000 barrels. The balance of the stocks are taken up in the factor of safety of 10,000,000 barrels which the Petroleum Committee of the State Council of Defense found essential to the safety of Pacific Coast industries, and in the oil pipe lines and tank bottoms estimated at 6,000,000 barrels. At the present rate of consumption over production the available stock will be exhausted in one year, after which the consumption of oil must be reduced 25,000 to 30,000 barrels per day. No advance in the price of oil has been made by the Standard Oil Company for nearly two years, or since May 1, 1918, when the United States Fuel Administration directed a $0.25 increase per barrel.

The following tabulation covers the record for the past five years:

Date	Crude Oil Stocks	Price at Well	Price at Seaboard
Jan. 1, 1916	57,147,051	$0.43	$0.80
Jan. 1, 1917	44,036,910	0.73	1.15
Jan. 1, 1918	32,450,465	0.98	1.45
Jan. 1, 1919	32,043,923	1.23	1.60
Jan. 1, 1920	30,480,323	1.23	1.60
Mar. 1, 1920	28,738,921	1.23	1.60

In 1918 the average daily consumption was 279,576 barrels. The last half of 1919 it was 292,278 barrels. In January, 1920, 301,100 barrels and in February, 1920, 304,120 barrels. In addition to this the fact is brought out that 7,000 barrels of fuel oil per day, which formerly went to Arizona from California, is now going to Arizona from Texas and Mexico. Added to these considerations are the demands of the Navy and of the United States Shipping Board. The former estimates its 1920 requirements on the Pacific Coast at 2,950,800 barrels as against 1,532,650 barrels in 1919. The Shipping Board has estimated theirs for 1920 at 4,000,000 barrels. * * * The California market for fuel oil and its products has ceased to be of only local interest. It has acquired a national and international importance. * * * California will be drawn upon for oil in the relation that California prices bear to prices elsewhere. The inevitable result will be that the Pacific Coast will be further drained of its supply by competition with other markets. It is obvious that there will not be enough oil to go around unless (1) production is increased or (2) the demand is conserved. We know of no other step to accomplish these results than an increase in the price offered for fuel oil and the price at which it is sold.

The condition today is even more serious than it was in 1918. The stocks are 4,000,000 barrels below the figure for that time and the consumption has increased a half-million barrels per month. There is further the fact that improved refining processes will reduce the available fuel oil within one year about 30%, equivalent to 20,000 barrels per day.

Following the 1918 advance in price the decrease of California stocks was checked. For the first time in three years the supply exceeded the demand—due to a diminished demand and stimulated production.

The Standard Oil Company is not eager to advance its prices for oil. This is proven as its competitors for three years have paid higher prices for refinable crude than has that company. In its efforts to promote conservation of the products of petroleum that company sells no crude petroleum for fuel oil, it sells only the residuum resulting from the distillation of crude oil. The present inability of hydroelectric companies to furnish their normal market with power, will throw on the oil industry the added burden of the demands of those consumers who heretofore used electric power and will now turn to fuel oil.

OIL STATISTICS FOR THE MONTH OF FEBRUARY

District	Gross Barrels	February	January	Daily Average 1919	1918	1917	1916
Kern River	601,040	20,725	20,654	20,907	22,083	23,543	23,397
McKittrick	209,737	7,232	7,186	7,773	8,385	8,974	9,170
Midway-Sunset	2,642,939	91,136	88,470	88,985	95,429	101,628	107,323
Lost Hills-Belridge	344,193	11,869	11,853	12,770	14,967	17,423	13,352
Coalinga	1,283,437	44,257	44,639	44,956	44,823	43,559	39,434
Santa Maria	473,831	16,339	16,306	16,665	19,747	16,393	11,973
Ventura-Newhall	161,379	5,565	5,310	4,858	3,827	3,115	2,976
Los Angeles-Salt Lake	112,589	3,882	3,606	3,625	3,691	3,981	4,739
Whittier-Fullerton	2,168,265	74,768	76,341	78,512	68,115	49,131	39,478
Summerland	4,500	155	145	148	148	148	147
Total	8,001,910	275,928	274,510	279,199	281,215	267,895	251,989
January	8,509,805	274,510	.....	275,928	275,928	275,928	275,928
Difference	507,895	1,418	.....	3,271	5,287	8,033	23,939

SHIPMENTS AND STOCKS

Stocks February 1, 1920	26,893,730
February production	8,001,910
Total	34,895,640
February shipments	8,926,466
Stocks March 1, 1920	25,969,174
Stocks decrease February	924,556
Stocks January 1, 1920	27,804,391
Total 1920 shortage	1,835,217
Daily average	30,587

DAILY AVERAGE

Daily	February	January	1919	1918	1917	1916
Production	275,928	274,510	279,199	281,215	267,895	251,989
Shipments	307,809	303,886	282,873	290,836	297,986	285,789
Shortage	31,881	29,376	3,674	9,621	30,091	33,866

This tabulation gives the California state oil statistics for the month of February. It is given here in addition to the accompanying statements which have been set forth by the Standard Oil Company and is given also as an independent source of information on the general subject of the oil situation in the State of California at this time.

The Standard Oil Company understands that the Commission's primary interest in this matter is in relation to the price of fuel oil for public utilities. The public also is interested in the price of gasoline and gasoline must be kept at a price level where it will not be shipped to other markets in quantities sufficient to deplete the California market. At the present time there is a 9c. difference in the price of gasoline between California and New York and as the rail rate to New York is 7c. per gallon and the water rate 4c., there is a differential which allows wholesalers, jobbers and others to ship California gasoline east at a profit. This may lead to a demoralization of the local market. The increase in the price offered for crude oil at the wells was made in the hope that an increase of $0.25 per barrel would stimulate production and tend to restore the balance between supply and demand. Past history has indicated that an increased price will result in an increased production and that an increase in price tends to conserve the use of fuel and check the depreciation of stock.

In the last analysis the Standard Oil Company is only one factor in the situation. It is the aggregate production of some 600 producers in California who alone can ameliorate the condition. The Standard Oil Company has strained every effort to increase its production for the purpose of meeting the shortage in the supply. This was done by intensive drilling and by the purchase and development of additional property. Having increased its own production to the maximum of its ability, that company sees no other course to increase the supply than to stimulate the others by offering a higher price for their product. The Standard Oil Company further states that they are currently declining export orders which return a larger profit than local sales.

CIVIL SERVICE EXAMINATIONS

The United States Civil Service Commission announces competitive examinations for marine, mechanical and electrical engineers, to be held on the 20th of April. Vacancies in the office of the Chief of Transportation Service, War Department, for duty at Washington, D. C., and throughout the United States, at $2,400 to $4,000 a year, will be filled from these examinations, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion. Both men and women are eligible, but appointing officers have the legal right to specify the sex desired in requesting certification of eligibles. Competitors will not be required to report at any place, but will be rated on the following subjects, which will have the relative weights indicated:

Subjects	Weights
1. Education and experience	80
2. Publications, reports, or thesis (to be filed with application)	20
Total	100

Under the first subject competitors will be rated upon the sworn statements in their applications and upon corroborative evidence.

Marine Engineer.—The duties of this position require training and experience in the designing of steel and wooden hulls of various classes of small-sized vessels.

Mechanical Engineer.—The duties of this position require training and experience in the manufacture, installation, or operation of mechanical equipment in connection with marine construction.

Electrical Engineer.—The duties of this position require training and experience in electrical machinery construction, testing of electrical machinery, installation of electric wiring, electrical machinery, or radio equipment in connection with marine construction.

TRADE NOTES

Construction of Four Buildings —

The Westinghouse Electric & Manufacturing Company has contracted with the Westinghouse, Church & Kerr Company to construct four new buildings at the plant in South Philadelphia. The expansion is intended to take care of the immediate needs incidental to the removal of the machine works (formerly the Westinghouse Machine Company) from East Pittsburgh.

The four buildings will be made of terra cotta and steel, and will be similar to the present buildings in construction and design. The new one-story machine shop will be used for building small turbines, another new shop will be used for the construction of large land and steam turbines. The erecting shop will be extended to meet the new machine shop and a three-story building will be constructed to provide warehouse facilities.

In order that the series on public utility relationships, by S. M. Kennedy, may extend through the special convention issues in May, the eleventh article of the series will be held over until the May 1st issue.

N. E. L. A. Convention Program

(The entire electrical industry in the West is looking to the big N. E. L. A. Convention which is to be held on this side of the continent for the first time this year. The following program, which includes a great many papers of interest to all branches of the electrical industry, convinces one that the programs of no previous conventions have equaled this in general scope or in the extent of social activities planned.—The Editor.)

Following is the program outlined for the convention of the National Electric Light Association at Pasadena, May 18th to 22nd. This is a tentative draft, subject to revision.

General Sessions

First General Session—Wednesday, May 19th, 9:30 A.M.

"Welcome to California." Hon. William D. Stephens, Governor.
Address by President R. H. Ballard, Southern California Edison Company, Los Angeles.
Appointment of Committee on President's Address.
Reports: Executive Manager, M. H. Aylesworth. National Electric Light Association, New York.
Committee on Water Power Development. Franklin T. Griffith, chairman. Portland Railway, Light & Power Co., Portland, Oregon.
Committee on Rate Research. Alex Dow, chairman. The Detroit Edison Co., Detroit.
Lamp Committee. Frank W. Smith, chairman. The United Electric Light & Power Co., New York.
Insurance Expert, W. H. Blood, Jr., Stone and Webster, Boston.
Address: Chairman of Commercial Section, John G. Learned. Public Service Co. of Northern Illinois, Chicago.
Division Report, Merchandise Sales Bureau; Electric Range. J. Paul Clayton, chairman. Central Illinois Public Service Co., Springfield.

Second General Session—Thursday, May 20th, 9:00 A.M.

Reports: Committee on Company Sections. F. A. Birch, chairman. The Philadelphia Electric Co., Philadelphia.
Committee on Geographic Sections. R. J. McClelland, chairman. American Business Corporation, New York.
Address: (Speaker and subject to be announced by Lighting Sales Bureau.)
Report of Committee on Commercial Service and Relations with Customers. R. F. Bonsall, chairman. Consolidated Gas, Electric Light and Power Co., Baltimore.
Election: Nominating Committee.
Report of Committee on Constitution and By-Laws. W. C. L. Eglin, chairman. The Philadelphia Electric Co., Philadelphia.
Appointment of Committee on Memorials and Committee on Resolutions.
Report of Bureau on Advertising and Publicity Service. L. D. Gibbs, chairman. The Edison Electric Illuminating Co. of Boston.
Paper by Service Committee. S. M. Kennedy, chairman. Southern California Edison Co., Los Angeles.
Reports. Membership Committee. Walter Neumuller, chairman. The New York Edison Co., New York.
Treasurer, H. C. Abell. American Light and Traction Co., New York.
Address by E. O. Edgerton, president California Railroad Commission, San Francisco.

Third General Session—Friday, May 21st, 9:00 A.M.

Address: Chairman Accounting Section. R. W. Symes, The Detroit Edison Co., Detroit.
Reports: Committee on Accounting Education. Douglass Burnett, chairman. Consolidated Gas, Electric Light & Power Co., Baltimore.
Committee on Relations with Educational Institutions. John F. Gilchrist, chairman. Commonwealth Edison Co., Chicago.
Committee on Accident Prevention. Charles B. Scott, chairman. Bureau of Safety, Chicago.
Committee on Safety Rules. W. C. L. Eglin, chairman. The Philadelphia Electric Co., Philadelphia.
Address: Chairman Technical and Hydro-Electric Section. I. E. Moulthrop, The Edison Electric Illuminating Co. of Boston.
Reports: Committee on Inductive Interference. A. E. Silver, chairman. Electric Bond and Share Co., New York.
Committee on Electrification of Steam Railroads. Frank M. Kerr, chairman. Montana Power Company, Butte.
Address: (Speaker and subject to be announced by Power Sales Bureau.)
Paper: Carl D. Jackson, chairman. Wisconsin Railroad Commission, Madison.
Report by Committee on Electrical Resources of the Nation. M. S. Sloan, chairman. Brooklyn Edison Co., Inc., Brooklyn.

Fourth General Session—Saturday, May 22nd, 9:00 A.M.

Address: Chairman Electric Vehicle Section. George B. Foster, Commonwealth Edison Co., Chicago.
Paper: "Electric Machinery For All Handling—An Opportunity." Zenas W. Carter, secretary. Material Handling Machine Manufacturers' Association, New York.
Reports: Public Information Committee. John F. Gilchrist, chairman. Commonwealth Edison Co., Chicago.
Committee on Bonus Systems. Harry A. Snow, chairman. The Detroit Edison Co., Detroit.
Education Committee. Fred R. Jenkins, chairman. Commonwealth Edison Co., Chicago.
Insurance Committee. E. J. Fowler, chairman. Commonwealth Edison Co., Chicago.
Committee on Cooperation in the Industry. Lee H. Newbert, chairman. Pacific Gas & Electric Co., San Francisco.
Committee on Sale of Company Securities to Customers and Resident Citizens. George R. Jones, chairman. Public Service Co. of Northern Illinois, Chicago.
Committee on Doherty and Billings Prizes. A. S. Loizeaux, chairman. Consolidated Gas, Electric Light and Power Co., Baltimore.
Committee on President's Address.
Committee on Constitutional Amendments.
Committee on Memorials.
Committee on Resolutions.
Nominating Committee.
Election and Installation of Officers.

Accounting Section

First Afternoon Session—Thursday, May 20th, 2:30

R. W. SYMES, Chairman
J. C. VAN DUYNE, Vice-Chairman

Address: Section Chairman, R. W. Symes. The Detroit Edison Co., Detroit.
Appointment of Nominating Committee.
Reports: Committee on Credits and Collections. David Darlington, chairman. The New York Edison Co., New York.
Committee on Classification of Accounts and Accounting Relations with Other Associations. Wm. Schmidt, Jr., chairman. Consolidated Gas, Electric Light and Power Co., Baltimore.
Committee on Form of Annual Reports to Commissions. W. J. Myers, chairman. The United Electric Light and Power Co., New York.
Committee on Merchandising Accounting. C. W. Johnson, chairman. Public Service Electric Co., Newark, N. J.
Committee on Accounting Service to Member Companies and the Monthly Bulletin. Frederick Smith, chairman. The New York Edison Co., New York. L. A. Coleman, Editor. The United Electric Light and Power Co., New York.
Committee on Motor Vehicle Records. G. P. Landwehr, chairman. The Philadelphia Electric Co., Philadelphia.

Second Afternoon Session—Friday, May 21st, 2:30

R. W. SYMES, Chairman
J. C. VAN DUYNE, Vice-Chairman

Reports: Committee on Purchasing and Storeroom Accounting. W. F. Stevens, chairman. The Edison Electric Illuminating Co. of Boston.
Committee on Federal Income Tax Procedure. H. E. Addenbrooke, chairman. Commonwealth Edison Co., Chicago.
Committee on Customers' Records and Billing Methods. J. D. Jacobus, chairman. The Detroit Edison Co., Detroit.
Nominating Committee on Section Officers.
Election of Officers and Executive Committee.

Commercial Section

First Afternoon Session—Wednesday, May 19th, 2:30

JOHN G. LEARNED, Chairman
M. S. SEELMAN, Vice-Chairman
HENRY HARRIS, Vice-Chairman

Address: Section Chairman, John G. Learned. Public Service Co. of Northern Illinois, Chicago.
Report of Finance Committee. M. S. Seelman, chairman. Brooklyn Edison Co., Inc., Brooklyn.
Appointment of Nominating Committee.
Reports: Committee on Constitutional Amendments. R. H. Tillman, chairman. Consolidated Gas, Electric Light and Power Co., Baltimore.
Committee on Wiring. R. S. Hale, chairman. The Edison Electric Illuminating Co. of Boston.
Bureau of Merchandising Sales. E. A. Edkins, chairman. Commonwealth Edison Co., Chicago.
Electrical Merchandise Division. F. D. Pembleton, chairman. Public Service Electric Co., Newark, N. J.
Division on Present and Prospective Conditions of Central Station Merchandising. Stanley A. Dennis, chairman. McGraw-Hill Publishing Co., New York.
Electric Shop Management Division. C. E. Greenwood, chairman. The Edison Electric Commonwealth Co. of Boston.
Standardization and Testing Division. O. R. Hogue, chairman. Commonwealth Edison Co., Chicago.
Research and Sales Promotion Division. Walter S. Byrne, chairman. Nebraska Power Co., Omaha.
Electric Range Division. J. Paul Clayton, chairman. Central Illinois Public Service Co., Springfield. (Discussion continued from General Session Wednesday morning.)

Second Afternoon Session—Thursday, May 20th, 2:30

JOHN G. LEARNED, Chairman
M. S. SEELMAN, Vice-Chairman
HENRY HARRIS, Vice-Chairman

Reports: Committee on Electrical Salesman's Handbook. I. Lundgaard, chairman. Rochester Gas and Electric Corp., Rochester, N. Y.
Bureau of Lighting Sales. Clarence L. Law, chairman. The New York Edison Co., New York.
Street and Highway Lighting Division. W. T. Dempsey, chairman. The New York Edison Co., New York.
Industrial Lighting Division. H. H. Magdsick, chairman. National Lamp Works of General Electric Co., Cleveland. (Note: A demonstration entitled "A Demonstration of the New Era in Industrial Lighting," in support of this Report, will be made elsewhere during the Convention.)
Residence Lighting Division. M. Luckiesh, chairman. National Lamp Works of General Electric Co., Cleveland.
Division on Light of Large Buildings. G. Bertram Regar, chairman. The Philadelphia Electric Co., Philadelphia.
Store Lighting Division. F. C. Taylor, chairman. Rochester Gas and Electric Corp., Rochester, N. Y.
Division on Commercial Aspects of Lamp Equipment. George H. Stickney, chairman. Edison Lamp Works of General Electric Co., Harrison, N. J.
Discussion of Preceding Reports.

Division Reports: Power Sales Bureau. Economics of the Use of Central Station Electric Power. John W. Meyer, chairman. The Philadelphia Electric Co., Philadelphia.
Power Sales Bureau. Electro-Chemical Processes. C. H. McClure, chairman. Commonwealth Edison Co., Chicago.
Power Sales Bureau. Industrial Electric Heating. N. T. Wilcox, chairman. Mississippi River Power Co., Keokuk, Iowa.

Commercial and Electric Vehicle Sections

COMMERCIAL SECTION

Third Afternoon Session—Friday, May 21st, 2:30

JOHN G. LEARNED, Chairman
M. S. SEELMAN, Vice-Chairman
HENRY HARRIS, Vice-Chairman

Report by Committee on Compensation of Salesmen. Adolph Hertz, chairman. The New York Edison Co., New York.
Election of Officers and Executive Committee.
Reports: Power Sales Bureau—Electric Steel Furnaces. Joseph McKinley, chairman. The Duquesne Light Co., Pittsburgh.
Power Sales Bureau—General Power. W. E. Murphy, chairman. Minneapolis General Electric Co., Minneapolis. (This report will consist of a paper by W. G. Taylor, General Electric Co., entitled "Electric Power in the Oil Fields.")
Power Sales Bureau—Power Contract. R. H. Ashworth, chairman. Utah Power and Light Co., Salt Lake City. (This report will consist of a paper, presented by the chairman, entitled, "Standardization of Power Factor Specifications in Power Contract on the Part of Central Station Companies.")
Power Sales Bureau—Isolated Plants. J. B. Stuart, chairman. Public Service Electric Co., Elizabeth, N. J.
Power Sales Bureau—Electric Development. Morse DellPlain, chairman. Northern Indiana Gas & Electric Co., Hammond, Indiana.

ELECTRIC VEHICLE SECTION

Afternoon Session—Friday, May 21st, 2:30

GEORGE B. FOSTER, Chairman
FRANK W. FRUEAUFF, Vice-Chairman

Address: Section Chairman, George B. Foster. Commonwealth Edison Co., Chicago.
Appointment of Nominating Committee.
Reports: Committee on Legislation. G. A. Freeman, chairman. Walker Vehicle Co., Chicago.
Committee on Standardization. E. R. Whitney, chairman. Commercial Truck Co. of America, Philadelphia, Pa.
Paper: "The Uses and Abuses of Electric Vehicles." H. J. Butler and W. J. Burns, Oneida Truck Co., Green Bay, Wis.
Committee Report: Electric Vehicle and Power Sales Bureau Cooperative. E. S. Mansfield, chairman. The Edison Electric Illuminating Co. of Boston.
Paper: "How the Power Salesman and Electric Vehicle Representative can Help Each Other Get More Business." (Author to be announced.)
Reports: Committee on Garage and Rates. Willis M. Thayer, chairman. The Hartford Electric Light Co., Hartford, Conn.
Committee on Federal and Municipal Transportation. James H. McGraw, chairman. McGraw-Hill Publishing Co., New York.
Committee on Transportation Engineering. F. M. Feiker, chairman. McGraw-Hill Publishing Co., New York.
Election of Officers and Executive Committee.

Technical and Hydro-Electric Sections

First Afternoon Session—Wednesday, May 19th, 2:30

I. E. MOULTHROP, Chairman
H. A. BARRE, Vice-Chairman
N. A. CARLE, Vice-Chairman
J. E. DAVIDSON, Vice-Chairman

Address: Section Chairman, I. E. Moulthrop. The Edison Electric Illuminating Co. of Boston.
Appointment of Nominating Committee.
Reports: Meter Committee. F. V. Magalhaes, chairman. The New York Edison Co., New York.
Committee on Prime Movers. N. A. Carle, chairman. Public Service Electric Co., Newark, N. J.

Second Afternoon Session—Thursday, May 20th, 2:30

I. E. MOULTHROP, Chairman
H. A. BARRE, Vice-Chairman
N. A. CARLE, Vice-Chairman
J. E. DAVIDSON, Vice-Chairman

Election of Officers and Executive Committee.
Reports: Overhead Systems Committee. W. K. Vanderpoel, chairman. Public Service Electric Co., Newark, N. J.
Underground Systems Committee. F. E. Ricketts, chairman. Consolidated Gas, Electric Light and Power Co., Baltimore.
Electrical Apparatus Committee. R. F. Schuchardt, chairman. Commonwealth Edison Co., Chicago.

MISSION PLAY

It has been arranged so that all of the delegates who attend the convention of the National Electric Light Association at Pasadena in May will receive invitations to attend the California Mission Play. The performance takes place in a unique little theatre constructed to resemble one of the old Missions of California and close by the historic Mission of San Gabriel. It is but a short distance from the Hotel Huntington, the headquarters of the gathering.

Immediately upon receiving their appointments from Convention Chairman Miller, Captain Morphy and Mr. Frost arranged with Mr. John Stevens McGroarty, poet, playwright and historian, and author of the Mission Play, to produce it at a special performance for the delegates of the convention in order that they may visualize the early history of California by means of its wonderful pageantry, stirring drama and sublime story of the founding of the white man's civilization on the Western shores of America.

San Gabriel and the Mission Play is often referred to as the Oberammergau of Southern California, even though it is vibrant with color and song, and laughter and dancing of the old Spanish times and the romance of the golden days of California. The play is in three acts. The first depicts the heroic struggle and sacrifices of the Southern pioneers to gain a foothold in California, when they founded that mighty chain of Franciscan Missions between San Diego and Sonoma, now lying in ruins along El Camino Real—the King's Highway. The second act depicts the Missions in their glory, while the last tells the sad but beautiful story of the Missions' ruin and the coming of the Gringo.

CONVENTION VISITORS

Among the prominent electrical men who have already signified their intention of attending the N. E. L. A. convention at Pasadena, May 18th to 22nd, are:

M. S. Sloan, president, Brooklyn Edison Co., Inc., Brooklyn.
D. H. McDougall, assistant to general manager, Toronto Power Co., Toronto, Canada.
Charles L. Edgar, president and general manager, Edison Electric Illuminating Co., Boston, Mass.
William H. Atkins, general superintendent, Edison Electric Illuminating Co., Boston, Mass.
Irving E. Moultrop, assistant superintendent construction, Edison Illuminating Co., Boston, Mass.
A. C. Marshall, vice-president, Detroit Edison Co., Detroit, Mich.
Frank W. Smith, vice-president, United Electric Light & Power Co., New York.
A. Monro Grier, president, Canadian Niagara Power Co., Niagara Falls, Ontario, Canada.
N. T. Wilcox, sales manager, Mississippi River Power Co., Keokuk, Iowa.
W. N. Ryerson, general manager, Great Northern Power Co., Duluth, Minn.
F. D. Sims, president and general manager, Washington Coast Utilities, Seattle, Wash.
W. E. Mitchell, assistant general manager, Alabama Power Co., Birmingham, Ala.
O. H. Simonds, general manager, Dubuque Electric Co., Dubuque, Iowa.

N. E. L. A. WORK ENDORSED

The following telegrams were received by President R. H. Ballard of the National Electric Light Association, subsequent to an address recently delivered by M. H. Aylesworth, executive manager of the Association, at the convention of the Oklahoma Utilities Association:

From Mr. T. A. Lane, president, Oklahoma Utilities Association:

"Electric Light Division of Oklahoma Utilities Association heartily endorsed by resolutions in Convention that it affiliate with National Electric Light Association. We appreciate the visit of Aylesworth and the boys agree that he is a real fellow."

From Mr. H. C. Cooper, secretary, Southwestern-Texas Association:

"Aylesworth's talk on National Association made so strong and favorable impression on the Oklahoma Association, as well as on myself as representative of the Southwestern Association, that I would urge as a necessity to both the National and Southwestern that he present it before our May Convention at Galveston."

From Mr. R. B. Schlaggett, president, Mississippi Electrical Association:

"I was present at address given by Aylesworth yesterday before Oklahoma Convention; was delighted with reorganization plans and am going to strongly urge Mississippi Section to remain affiliated with National."

From Mr. Aylesworth:

"Big meeting here went well. Mississippi, Texas and Oklahoma in line."

The program of Geographic Sections as well as the work of the Association as a whole is receiving the heartiest support in all sections of the country.

NEW ELECTRICAL DEVELOPMENT

(Reports from the Northwest include the establishment of a hydroelectric plant by the Rainier National Park Company and plans for the construction of a $500,000 municipal plant in Oregon. The Hetch-Hetchy project development stands out among Pacific Central items while news of construction work in Arizona and of the development of power and street lighting come from the Southwest and Inter-Mountain districts.—The Editor.)

THE PACIFIC NORTHWEST

YAKIMA, WASH.—The Pacific Power & Light Company will spend $30,000 in making improvements to its plant.

PORTLAND, ORE.—G. L. Hutchin has been given the contract for fifteen four-horse electric floats to be used in the Shrine convention parade on June 22nd, and in the Rose carnival parade on the 29th.

SNOQUALMIE, WASH. — Snoqualmie Falls Lumber Company of this city has ordered through the Seattle office of Allis-Chalmers Manufacturing Company four induction motors for use in its saw mill at this point.

PORT ANGELES, WASH.—The Zellerbach Paper Company has awarded contract and started excavation for its extensive paper mill at this place. Westinghouse Electric & Manufacturing Company has been awarded the contract for the electrical equipment.

BLAINE, WASH.—Chief Engineer Eddy, and General Freight and Passenger Agent W. D. Power, both of the British Columbia Electric Railway, were here recently to confer with local people regarding the extension of the company's line from Cloverdale, B. C., to this place.

ROSEBURG, ORE.—Acting on the reports of Mayor Hamilton and Engineer E. Summers, the city council has taken steps necessary to place the proposal for a $500,000 bond issue before the voters for the purpose of constructing a municipal power plant at Whistler's Bend and a municipal light and water system in the city. The election will be held in May.

SEATTLE, WASH.—The figures upon which the city proposed to base negotiations for the purchase of the Seattle & Rainier Valley Railway have been submitted to the city council utilities committee by Councilman W. H. Moore. The amount is $765,750. E. W. Sampsell of Chicago, president of the company, refuses to negotiate on the basis of Councilman Moore's report.

CHINOOK, ORE.—That this place will solve the problem of the minimum cost of electric lights is assured. The Commercial Club is agitating the matter. It is proposed to organize a stock company locally and petition the fisheries department to increase the size of the proposed pipe line from six inches to 10 inches, the added expense to be borne by the company. The company would then install a turbine. It is also proposed to build a reservoir on the Chinook river which would insure service during the dry months.

KLAMATH FALLS, ORE.—The California-Oregon Power Company is ready to relinquish its contract with the United States government for the building of the Link river dam, which includes provisions for the storage and distribution of power and irrigation water supply in the Upper Klamath lake, on assurance that the government will build the dam at once. This is according to a statement of George J. Walton, local superintendent of the company, at a conference with water users and American Legion representatives here.

PORTLAND, ORE.—At the annual meeting of the Northwestern Electric Company reports were given which showed that the gross receipts of the company have increased over the same period in 1918 by $270,554, or 26 per cent, and the net profits increased $85,268, being an increase of 32 per cent over 1918. The net profit of $354,400 for the year 1919 is more than three times the preferred stock dividend, and after deducting the dividends paid on preferred stock of $112,218 there is a surplus remaining from the year's operations of $242,182, which makes the total earned surplus to December 31, 1919, $742,933.

PORTLAND, ORE.—The recent controversy between the Klamath Falls post American Legion and the California-Oregon Power Company regarding the disposition of the water of the Klamath river and the water of upper Klamath Lake, in connection with the leasing of the surrounding land to Doak and Brown for a long term of years, has been settled by the passing of a compromise resolution asking Congress to appropriate funds for the completion of the Klamath irrigation project according to original plans. This provides for the irrigation water for 250,000 acres of land being insured before the same is made available for power purposes.

SEATTLE, WASH.—Thompson & Castleton, Inc. are installing a 400-kva. steam turbo generator set for the N. Campbell Shingle Company at Ballard, together with ten 25-hp., 1800-r.p.f. motors and a number of smaller motors for driving shingle machines. They recently electrified the plant of the Central Sand & Gravel Company, three miles beyond the city limits of Seattle, current to be supplied by the city lighting plant, and are also replacing the distillate engines in the Beauclaire Packing Company's plant at Port Beauclere, Washington, with motors, including two 30-kw. generators driven by semi-Diesel engines, and a number of smaller motors. This step was taken because of the removal of distillate from the market.

VALE, ORE.—J. Edwin Johnson of this place has filed with the state engineer at Salem, an application for permit to appropriate 100 second-feet of water from the middle fork of the Malheur river to be used in developing 35,444 theoretical horsepower. The diversion works will include a concrete dam five feet high, 60 feet long at the top and 40 feet at the bottom with waterway and concrete headgate with two openings. Water will be delivered from the forebay to the power house through two penstocks. Power will be generated by turbine water wheels and will be used in pumping water for irrigation in Harney Valley and for municipal purposes. The work is to begin one year from date of permit and will be completed in three years, at an estimated cost of $350,000.

TACOMA, WASH.—The Rainier National Park Company, which built some large tourist hotels in the Park recently, is establishing a hydroelectric plant on Paradise Creek. This will comprise a 400-kva., 2300-volt, 60-cycle, three-phase horizontal alternator direct connected to an impulse wheel for operating under a head of 500 feet. The power will be used for supplying light and heat to the various hotels and camps in the park. The guests' rooms at the hotels will be provided with electric heaters and several hundred of them will be used. The power will be transmitted by step-down transformer located to serve Paradise Inn in Paradise Valley, as well as the hotel at Longmire Springs. The entire equipment is being furnished by the Allis-Chalmers Manufacturing Company through the Seattle office, including hydroelectric unit, gate valve and transformer. The installation is being made by Thompson & Castleton, Inc., of Seattle.

THE PACIFIC CENTRAL DISTRICT

SAN FRANCISCO, CAL.—The Railroad Commission has instituted an investigation into the matter of the construction and operation of electric utilities and the disposition and transfer of electricity during the present emergency created by the abnormally low precipitation. A public hearing was held before the commission on March 24, at the commission's offices.

SAN FRANCISCO, CAL.—The Western States Gas and Electric Company, which operates in Stockton, Richmond and Eureka, has been authorized by the Railroad Commission to issue $603,000 par value of its 7 per cent cumulative preferred stock. The order provides that the company shall use $454,600 of the proceeds of the stock sale to meet sinking fund payments. The balance is to be used to pay for construction work.

OAKDALE, CAL.—Recent arrivals from the mountains say there is more water on the Stanislaus watershed than in several years. The recent rains in the valley were accompanied by snow in the hills. Many irrigation men look for a better irrigating season this year than last, and if there is the usual cool spring, it is believed there will be water until August.

RICHMOND, CAL.—A movement in Richmond to have all electric wires placed underground is to be first acted upon by the Pacific Telephone & Telegraph Company, according to information given to the city council by the fire chief. He asked, in connection with the action, what disposition the council wished to make with regard to the fire alarm wires which are now carried on the telephone poles. The matter was referred to the fire chief and the fire committee. The fire chief objects that the telephone company's action, which would start on Macdonald avenue, would probably be followed by other companies having electric wires, so that the only poles left standing would be those of the street car company.

MODESTO, CAL.—The directors of the Modesto Irrigation District have engaged John Francis Neylan of San Francisco, former chairman of the State Board of Control, to settle their dispute with Turlock over the appointment of a chief engineer at the Don Pedro dam. Mr. Neylan has promised to submit a definite plan of operation which will be acceptable to both districts.

ALTURAS, CAL.—The election in the Hot Springs irrigation district in this county resulted in a unanimous vote in favor of issuing $100,000 worth of bonds. The district was recently organized. Thousands of acres will be irrigated when the reservoir known as the Big Sage Reservoir is constructed.

SAN FRANCISCO, CAL.—April 21st is the date set by the board of public works to consider bids for the construction of aqueduct tunnels in the mountain division of the Hetch-Hetchy project, under Contract No. 77, specifications for the work having been completed by M. M. O'Shaughnessy, city engineer. The contract covers the portions of the aqueduct between Early Intake and Priest Portal, a distance of 18.3 miles. Provision is made in the specifications and proposal for a division of the work into two sections, if such division be found to be to the best financial interests of the city. The divisions are as follows: Contract 77A—Covering the aqueduct between Early Intake and the south

fork of the Tuolumne river, 4.5 miles; Contract 77B—Covering the aqueduct between the south fork of the Tuolumne river and Priest Portal, 13.8 miles. Bonds for the work have been fixed as follows: Contract 77, $800,000; Contract 77A, $200,000; Contract 77B, $600,000. In accordance with the requirements of the city charter, an additional bond in the sum of not less than one-half of the total amount payable by the terms of the contract is required.

REDDING, CAL.—The Happy Valley Irrigation District sold $100,000 in 6 per cent bonds to Stephens & Company of San Francisco at 97.3 and accrued interest. This is the last of the block of $615,000 originally voted. The directors report that they will have plenty of money to complete the system. The Messelbeck dam, which makes a great storage reservoir, was completed, thus assuring plenty of water for Happy Valley for this season. The reservoir holds 5000 acre-feet of water.

RIVERDALE, CAL.—The Riverdale irrigation district will hold an election of directors on April 10th.

GRASS VALLEY, CAL.—The Brandy City gravel mines on north Yuba river, with water development and concrete dam of the Marysville-Nevada Water and Power Company, have been sold to Bulkeley Wells and associates.

GRIDLEY, CAL.—Engineers representing the Pacific Pipe Company of San Francisco arrived in Gridley to commence the survey for a gas manufacturing and distributing plant for this city.

VACAVILLE, CAL.—The Vacaville Water and Power Company has filed a suit against the Pacific Portland Cement Company asking a judgment in amount of $25,000 as damages and that the defendant be restrained from carrying or taking any water from certain basins near Vacaville.

RIVERDALE, CAL.—Adopting a resolution establishing the boundaries of the district, the board of supervisors has fixed April 10 as the date for the election of the new Riverdale irrigation district. Three directors and one other officer, holding the consolidated post of assessor, collector and treasurer, are to be voted for.

COLUSA, CAL.—By filing with the supervisors a petition signed by three-fourths of the property owners, the Williams Irrigation District has gone over the head of State Engineer W. F. McClure and obtained the approval of the supervisors for the legal formation of the district. State Engineer McClure refused to endorse the district, which is designed to irrigate 10,000 acres for rice, due to the water shortage. He pointed out, however, that the district could go over his head by a majority of signatures.

THE PACIFIC SOUTHWEST

BRAWLEY, CAL.—The Oakley Company has been authorized to have work proceed at once on the extension of water plant, new reservoirs, ditches, etc.

LOS ANGELES, CAL.—An ordinance has been passed granting the Pacific Electric Railway Corporation a franchise to construct and lay a single railroad spur track on Santa Monica Boulevard, etc.

LOS ANGELES, CAL.—A plan is under consideration for the extension of the Stephenson Avenue street car line to Fourth Street Bridge and to connect Traction Avenue and Second Street to take care of East Side traffic.

CLIFTON, ARIZ.—Greenlee County Water Users' Association contemplates the erection of a diversion dam on the upper Gila River which would reclaim several thousand acres of new land in the Duncan Valley. F. J. McGrath of Franklin is president of the association.

EL CENTRO, CAL.—The Imperial Irrigation District Board of Directors contemplate calling a bond election for at least $9,000,000, to provide funds for building the Laguna Dam to Hanlon's, as the first initial step toward the construction of the All-American Canal.

EL CENTRO, CAL.—The city council has decided to place proposals to issue $190,000 bonds for reconstruction of the municipal water reservoir at New River, $31,900 for ornamental street lighting, and $15,000 for an automatic fire alarm system, on the ballot at the city election April 12th.

OJAI, CAL.—The Sespe Light & Power Company is putting in a power plant on the Sespe river near Hot Springs, and has filed plans for financing construction costing $1,000,000 by the issuance of first mortgage bonds and $1,000,000 capital stock. Four dams are to be constructed, three conduits and three power plants.

ONTARIO, CAL.—Ontario Power Company, which sells electric energy in the cities of Ontario and Upland, San Bernardino county, has applied to the Railroad Commission for authority to issue $74,000 par value of its 7 per cent preferred stock. The proceeds are to be used to discharge notes aggregating $24,000 and to finance, in part, improvements that have been made to the company's system.

PHOENIX, ARIZ.—Reconstruction of most of the overhead electric work done throughout Arizona became a possibility recently when an appeal was filed in the state supreme court by the Pacific Gas & Electric Company, of Phoenix, against the state of Arizona. This was an appeal from a decision of the superior court of Maricopa county on an action against the Pacific Gas & Electric Company which was, in effect, a test of an initiated law to govern overhead electrical construction, and by virtue of which decision a small fine was imposed on the company.

LOS ANGELES, CAL.—The Southern California Edison Company has elected the following officers, and their duties are now fixed to provide for the necessary substantial increase in power development and to facilitate the operation of their greatly enlarged business: John B. Miller, chairman of the board of directors and president of the corporation; W. A. Breckenridge, senior vice-president, in charge of power development; R. H. Ballard, vice-president and general manager; G. C. Ward, vice-president, in charge of operation and construction. General superintendents, construction engineer, electrical engineers and right-of-way agent will report to Mr. Ward; A. N. Kemp, vice-president and comptroller, in charge of finance and accounts. The treasurer, auditor, purchasing agent and general storekeeper will report to Mr. Kemp; S. M. Kennedy, vice-president and general agent, in charge of business development and personal relations; A. E. Morphy, secretary; W. L. Percy, treasurer; and R. V. Reppy, general counsel, in charge of local affairs.

THE INTER-MOUNTAIN DISTRICT

EUREKA, UTAH.—This city has granted a renewal of the franchise to the Utah Power & Light Company.

SALT LAKE CITY, UTAH.—Electrical interests of this city are conducting a campaign to educate the public to the value of convenience outlets for the use of various devices. The newspapers are offering splendid cooperation to put this idea across.

WASATCH, UTAH.—To generate power for power and lighting at this place, the Whitmore Oxygen Company of Salt Lake City has applied to the state engineer for permission to divert thirty second-feet of water from Little Cottonwood Creek, Salt Lake County, the water to be carried through a flume and pipe line a distance of 6250 feet.

DENVER, COLO.—Directors of the General Electric Company have authorized the offering of new stock to present shareholders at $125 a share on the basis of one share of new for ten shares now held. Holders of record April 6th were given the privilege of subscribing, the expiration date being May 20, payment for the new stock being required to be made on or before that date.

FALLON, NEV.—Stating that a deficit of $191,714 has been incurred on the Newlands project between 1918 and 1919, Director A. P. Davis of the United States Reclamation Service has written to the president of the Truckee-Carson irrigation district, suggesting plans for retiring the debt. The president prefers an added tax for operation and maintenance of $28,757 paid annually until the debt is wiped out.

DOUGLAS, WYO.—The report of the findings of the Wyoming Public Utilities Commission upon the complaint of the town of Douglas against the Douglas Electric Light Company has been received by the mayor. The findings as a whole give the city a reduction in rates. The chief point won by the city was in the reduction of the pumping rate from 7½ cents to 4 cents per kw. This will mean a big saving to the city in the course of a year.

FORT MORGAN, COLO.—Supervisor Glenn White has completed a map of Morgan county which easily surpasses any map ever produced in this section. After many months of work the map is now ready for distribution and is most favorably spoken of by all who have inspected it. The location of the towns, streams, irrigation systems and boundaries are shown with an accuracy that makes it reliable for deciding locations and boundaries not heretofore enjoyed in access to a map.

COLORADO SPRINGS, COLO.—It will be up to the city electrician to install the ornamental lights on Pike's Peak avenue from Nevada avenue to the Santa Fe station, inasmuch as no bids were received for the installation of the lights by City Clerk Ewing. The ordinance creating the new lighting district went into effect on March 16. At the first reading of the ordinance, the city clerk was instructed to advertise for bids. It will be necessary for the city electrician to enlarge his force of men for this work.

PUEBLO, COLO.—Ground will be broken about the middle of April for the new 10,000-horsepower electric generating station of the Arkansas Valley Railway Light and Power Co. Construction will be pushed as rapidly as possible, for the large brick and steel building must be ready to house the generating equipment and boilers when the latter arrive. By the time the new powerhouse is completed a large part of the energy which it will produce will be needed by the growth of the demands upon the company for power, lighting and heating, it is thought.

DUGAN CITY, COLO.—The committee of fifteen appointed by the Chamber of Commerce to investigate and make recommendations in the matter of proposed electric power possibilities, has made its report to the city council. This report, which was read at a special session of the council, bears the signature of all members of the committee. The committee favors the recommendations of George G. Anderson, the Los Angeles, Cal., engineer, looking toward municipal ownership of the power resources of the region. Also it asks the city officials to finance additional surveys pertaining to possible developments on the south slope of Pike's Peak.

LOVELAND, COLO.—Suit was filed in district court at Fort Collins recently by the city of Loveland to condemn the property of the Western Light and Power Company in Loveland for the purpose of the projected municipal electric plant. This suit carries out the intention of the city council recently announced after negotiations for purchase of the property by the city had failed. The suit is directed against the power company as owner and the Franklin Trust Company of Philadelphia, trustee for the bondholders, and seeks to take for the public use the real estate, electric sub-station, transmission lines, and all appurtenances pertaining to the company's distribution system in the city of Loveland.

The mark of a wise man is to recognize a good thing when he sees it. We don't know the canny Scot who wrote the following tribute, but we think he has the mark of a wise man:

If it delichts ye
Fir tae cast yir een
Ontae a lad
Thot juist fair radiates
Satisfaction
Wi' things as they are
Ye suld hae been wi' me
Day afore yesterday
Recht efter the braw rain
When I met oop
Wi' this here lad,
A. G. Wishon,
The high muck-a-muck
O' the power coompany.
He wes cumin' doon
The sidewalk on J street
And he wore a luik
On the face o' him
Thot wuld hae tempted me
Fir tae ask him
Fir tae lend me ten dollars
Till pay day cum around
If it hedna been
Thot I'd juist tapped
The pocket-buke
O' the gudewife
Afore I left the hoose.
He wore a smile
Thot resembled the smile
Thot ye'll see
On an auld tabby-cat
Recht after she's caught
A wee bit mousie
And played wi' it
And made a meal aff it
And finished oop
Wi' a saucer o' cream.
Satisfaction wes there
And real couthy joy
And goblets o' gledness.
There wes a noise
Oot on the street
Frae a coople o' flivvers
Sae I culdna tell
If he wes purrin',
But I make nae doobt
That he wes
And I'm convinced,
Frae the general luik
O' happiness aboot him,
That the verra minute
He got intae his office
And got the dure shut
And telt the office-lad
No tae disturb him
Thot he licked his paws
And washed his face.
Mon-o-dear folk,
But he wes pleased
Wi' ilkathing
And ilkabody.
The drouth wes broken
And the rains hed fallen
And snows hed cum
In the high mountains
And in the een
O' this here lad
Ye culd see the reflection
O' the great rainbow
O'pleasant promise
Fir mair water
Tae fill mair dams
Tae make mair power
Tae water mair acres
And licht mair lichts.
I'll juist bet ye
That if I'd stapped him
And stroked him gently
He'd hae crackled
Wi' electricity.
It's a cheerin' sicht
Fir tae lay yir een
On sic catisfaction.
It warms oop
The cockles o' yir heart
And puts jazz
Intae the blude o' ye
And ye lift yir feet
A bit mair hastily
And set them doon
Wi' mair firmness,
"A's weel wi' the world"
The lad seamed tae say
And his smile proved it
Till ilkabody he met
Fell in line wi' him
And smiled wi' him
And were happy
Thot the rains hed cum
And the snows descended.
Yir Frien',
SCOTTY.

* * *

Power shortage would seem to be due to Nature overhearing our "stop spending" slogans, if the dictum of a certain rural oracle counts for anything . The aforesaid oracle was answering the torrent of eager questions put to him by the returned soldier, who had been away from the little town for three years.

The soldier, checking up familiar landmarks, had just missed something.

"Where's Hodge's other windmill?" he asked in surprise. "I can only see one mill, and there used to be two."

The native gazed thoughtfully around as if to verify the statement. Then he said, slowly:

"They pulled one down. There weren't enough wind for two of 'em!"

* * *

A common commercial language would seem to be a 'safety-first' measure as well as the other things its advocates claim for it. The following story, which, by the way, comes to us from someone who asserts that Minnesota is a Pacific Coast state, illustrates the dangers of a private vocabulary in inter-state commerce:

W. T. Richardson, one of the Western representatives of the electric cleaner division of the Torrington Company, has a small son who, at the early age of two years, coined the word "boo" for vacuum cleaner. The small son is now six years old but the word boo is still current in the family. Recently Mr. Richardson after an especially successful day telegraphed the wife and boy thus:

"Sold $12,000 worth of boos today."

The telegram fell under the watchful eye of the government drink sleuths and immediately the hotel quarters were raided in search of the forbidden liquid.

We have it on good authority that the search was fruitless, but Mr. Richardson proposes to revise even his family vocabulary to conform to constitutional amendments when using the telegraph system.

* * *

If it weren't for parents, children might know something about electricity. Little Willie said to his father:

"Father, what is that little wire tied to the big one for?"—pointing to the stranded-iron messenger wire supporting the lead-covered telephone cable.

"That, my son, is to keep the birds from standing on the big wire and getting shocked."

* * *

HELPFUL HINTS TO THE METER MAN—No. 3

It takes nerve to calmly read a meter with some ferocious animal threatening to bite, mangle or devour one. Of course it is true that many a dog's bark is worse than his bite, yet, if the meter man wishes to maintain perfect composure of mind throughout his expedition he should adopt this latest in uniform suggestions. Furthermore, this type of suit would do away with the regular wear and tear on clothing, and it also might tend to distinguish the meter man from all other household visitors.